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"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

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Prize Essay.*

THE PROPER MILITARY INSTRUCTION FOR OUR OFFICERS. THE METHOD TO BE EMPLOYED, ITS SCOPE AND FULL DEVELOPMENT.

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"The aim of education is the perfection of the individual."—CICERO.

"I call a complete and generous education, that which fits a man to perform justly, skillfully, and magnanimously, all the offices both public and private of peace and war."—MILTON.

"Man is nothing but what education makes of him. Education is an art which must be brought to perfection by the practice of many generations. It is above everything an experimental science."—KANT.

INTRODUCTION.

THE subject is a very comprehensive one and can only be treated broadly in a limited article. Methods of instruction, and aims of education, have occupied the attention of philosophers and pedagogues since the day when language was first written. Many theories have been advanced, many systems tried, but the infinite grinding and sifting of all has not yet evolved one so obviously correct that it must be accepted as the basis of instruction and the key to success. How shall we educate and be educated, is still a perplexing and unanswerable question. Locke, Kant, Montaigne, Pestalozzi, Frobel and Spencer

* Board of Award, General E. S. Otis, U. S. A., General Francis A. Walker, U. S. Vols., and Col. L. H. Carpenter, U. S. A.

have originated beautiful systems for single individuals with permanent instructors, but generally impracticable for purposes of the State.

Our modern systems have drawn something from each, but no philosopher has appeared to form a composite pen picture in which the strength of each shall be readily distinguishable to the casual observer, and the whole be a striking illustration of a rational and philosophical system of instruction.

When the science of Psychology becomes better known, we may possibly arrive with more certainty at the true order of studies, and constant experiment and observation will improve methods of instruction, but I doubt if the art of education will ever become sufficiently exact and specific, to enable us to assign definite values to the many subjects taught, and thus arrange a scale from which the student may select such as will give him the greatest benefit in the allotted time.

In our country systems vary from the "elective system with guidance" of Harvard, to the absolutely compulsory ones at the two national academies; and the courses, from 190 at Yale University, to one at West Point. As to their respective merits, there are as many shades of opinion as are possible between these wide limits.

Where an education is desired for a special kind of work, to be pursued as a means of livelihood, such as engineering, electricity, mining, or for the purposes of the State, such as military education, many of the difficulties disappear, but the general question, as to how much time and labor shall be given to the absolutely utilitarian, and how much to accomplishments and general knowledge which broaden the mind and increase the usefulness and happiness of the individual, remains unanswered.

It is plain the subject cannot be treated dogmatically; we must accept the statements of Locke, Montaigne, Spencer, Bain, and other philosophers, with due respect for their great wisdom, and modify the applications of them to our own needs.

The military institutions of a country must take their tone from the civil institutions under which they live. This is particularly applicable to us. Civil institutions are supreme. It is not probable that we shall ever have a large standing army, or that Congressional liberality towards the military establishment will be materially increased in the near future. Congress appropriates what it considers necessary for the support of the army. It is

plainly our duty to make the best possible use of the means given to us. A feasible and just system of instruction must be applicable to existing conditions. Until we have reached the highest possible degree of efficiency under these conditions, we shall have no just claim for increased legislative benefits. I shall therefore base my methods upon the military establishment of to-day.

THE OFFICER.

The subject may be approached in many ways. We might attempt to outline the extensive courses of instruction necessary to the perfecting of cavalry, infantry, artillery and staff officers for service in a modern army, but we cannot claim the unusual erudition and experience implied by such a course. He is indeed a rare officer who feels at home in all arms of the line, and he is a very valuable one who is thoroughly equipped theoretically and practically in his own arm.

The most rational method would be, to begin at the source of our present system and follow it through its meanderings, suggesting such changes as we may judge necessary to improve it, and put it in accord with the conditions which confront us.

An examination of the Army Register shows us that nearly 80 per cent. of our company officers are graduates of the Military Academy, and the others have been drawn from civil life and from the ranks.

During the past ten years appointments from civil life have been rare. Unless we have war, or a radical re-organization, we may justly assume that about 85 per cent. of our company officers will come from the Military Academy and 15 per cent. from the ranks. This naturally divides the subject into three periods, viz.:

1. The Military Academy training.
2. Post-graduate schools.
3. Service training.

We may change Milton's definition and call a complete and generous education for an officer, "that which fits him to perform justly, skillfully and magnanimously, all the duties of his position in peace and war."

What are the qualifications of the ideal officer we hope to develop? He must have courage and discipline; he must be highly honorable, and temperate in all things; he must have a sound mind, not necessarily brilliant; a thorough knowledge of his own arm, and a good knowledge of the Art and Science of war;

a robust constitution, and such accomplishments as may serve to place him on an equality with his social peers in any community.

There are natural qualities necessary to a distinguished career in the profession of arms, such as determination, will, fortitude and self-confidence. While these may be cultivated to a slight degree, they are essentially the gifts of heredity, and we need go no further than the War of the Rebellion for ample proof that soldiers are frequently born and rise to eminence through inherent qualities, and without the advantages of previous military instruction.

If we could obtain youths with these natural gifts, and build upon them the other qualifications, the ideal would be reached. There were many men greater than Grant in theoretical knowledge of the art of war and in literary attainments, but none greater in determination, self-confidence, fortitude and magnanimity.

Highest types mark periods in evolution and must not be taken as foundations for systems to be applied to groups or masses; we must build for the average which can be drawn from the brightest and dullest. I shall imply average gifts and abilities.

The officer's instruction must be moral, intellectual and physical. It is impossible to specify the scope of each, for no two individuals are duplicates, and the single individual who is equally capable or equally endowed mentally, morally and physically, can be found only in the very highest type, or in the lowest human wreck. On this I base the claim that the most successful instruction must recognize the individual not as an abstract unit, but as an organized being, with a personality capable of great development on some lines, and susceptible to grave injuries on others.

"There are varieties of gifts, call them if you will, fundamental differences, that make it impossible to train successfully all of a group of boys to the same standard. These differences are partly matters of sheer ability, and partly matters of taste; for if a boy has so great an aversion to a given study that he can never be brought to apply himself to it with some measure of fondness, he is as sure not to succeed as if he were lacking the requisite mental capacity."—President ADAMS, Cornell University.

It remains to be seen how far individual instruction can be carried with a body of youths or men who are being educated for the service of the State.

THE MORAL INSTRUCTION OF THE OFFICER.

General Blondel has said that "all the virtues of the soldier are combined in two—courage and discipline."

This may be true for the man in the ranks, but the officer must go higher. He must be a moral man; a man of honor, of intellect, of justice, of magnanimity and self-denial; "Looking on his officer as a man who can do no wrong, the soldier shall follow as a matter of course."—German.

In the main these qualities are inherited, or are the result of home training, and have been developed when the candidate for a commission presents himself for instruction.

Fortunately most of our young men are found to be honest, manly and courageous, and need only to be told the required standard, to reach it. For them, a course of instruction by lecture on the ethics of their profession, early in the first year of their novitiate, coupled with the example set by their superiors, will suffice to put them on the path which leads to an honorable career.

Under a system of repression and punishment, a youth of low instincts often conceals his true nature, until liberty throws off the mask, and he disgraces himself and the service.

Moral instruction cannot be made efficacious by a purely compulsory system. Liberty is essential to a growth that must be able to withstand the buffetings of life's storms. Restraint whets the appetite for forbidden things. Liberty divulges character and exposes its strength or weakness. The cadet is taught that honor is the soldier's priceless treasure. The standard is high, yet the cadet is not trusted alone across the line marking "cadet limits." It seems as though we were afraid to trust him with his own conscience for a few brief hours. Suddenly all restraint is removed, a new world is opened to him. The strong gain in strength; the weak go to the wall. We want to discover the weak before the Government expends $30,000 apiece on their education, and before they get an opportunity to disgrace our uniform. The cadet should have more liberty during the few hours granted him for recreation.

Scharnhorst wrote to his king: "We have begun to think more of the science of war than of military virtues, but this has ever been the ruin of nations." The military virtues are courage, obedience, loyalty, honesty and zeal. When these qualities grow weak in the people, the nation must indeed be near the hour of dissolution.

The moral instruction of the officer is in the hands of his comrades and his superiors. The young officer is greatly influenced by the moral tone of his regiment. If it is high, he will grow up to it; if it is low, he is (unconsciously, perhaps) brought down. It is very essential that he be started on the right road and that the first leanings towards vicious habits and indolence be promptly checked by kindly counsel; if this fails, more stringent measures should be adopted. Idleness was for many years the curse of the army. A healthy mind is energetic, and unless this energy is directed into useful channels, it runs to waste. There has been great improvement in the past decade, but the road is still open. Systematic daily work occupying at least half of the working hours of the day, will do much towards maintaining military virtues where they already exist, and towards stimulating them where they are weak. I do not believe in useless work for work's sake. I hope to suggest a course of training which shall contain plenty of profitable and interesting employment.

It is difficult if not impossible to construct a satisfactory course of instruction in morals for young men who are removed from home influences. It is possible to give to young men who are being educated to be "officers and gentlemen" sound instruction in the ethics of their profession. This should be done by lectures, to be given by the commandant of cadets. They should be reinforced by the example* set by all officers with whom cadets are brought in contact.

"Courage springs from pride, self-esteem, force of will; it is often a conquest of native weakness in the discharge of duty, and once attained can rarely be overcome." Courage is not the absence of fear but the power to overcome it. Bravery is inherited. Courage is of higher quality and can be cultivated by stimulating professional pride, self-respect and manliness; by honoring the flag, and by keeping before the student a knowledge of the brave deeds of his ancestors.

DISCIPLINE.

"The object of discipline is to strengthen the character for the purposes of morality."—HERBART.

"By discipline the Germans mean all the military virtues; the qualities of the will and heart and not merely those of the intellect."—FOUILLÉ.

* Example exercises more beneficial action than written laws and words.—DRAGOMIROW.

For the officer, discipline is not merely a material thing, to be shown by the simple observance of a great many set rules and prescribed forms of action. It is a moral quality, a condition of heart which leads him unhesitatingly to his duty under all circumstances, without hope of reward or fear of punishment, save in the inner satisfaction he feels when he has done his best. The German definition is not too comprehensive for the officer. He should possess all the military virtues.

Discipline may be created and maintained in four ways:

1. By creating in the heart a spirit of devotion to the cause.
2. By instruction.
3. By rewards.
4. By punishment.

The third and fourth methods should never be necessary in the instruction of the officer. Starting with the second method we must reach the first. There is a sentiment growing in the minds of the best military thinkers of the day "that habit and intelligence, fear of punishment and hope of reward are no longer sufficient to persuade the soldier to face the danger he will meet in a modern battle. He must be made to feel that the general's business is his as well; he must be animated by the same feeling and worked on by the same impulses."—HOENIG.

If this is true for the man in the ranks, how strongly it must be emphasized for the officer. The psychological features of training in discipline must be recognized. Mere mechanical training and habit will not suffice. Modern discipline is not satisfied with mere lip service and perfunctory obedience. Loyalty, zeal, enthusiasm in assisting the commander, and a determined will to conquer all difficulties, are necessary attributes of a thoroughly disciplined officer in a modern army. The instruction of the young officer, in discipline, should begin the moment he joins the service. We occasionally hear officers of rank complain that the young officers who join from the Academy are not as well-disciplined as they used to be. I do not agree with them. The discipline (of its kind) at the Academy is as good as it ever has been. The methods have not changed materially in the past twenty-five years. The trouble is in the service. These young men are not properly started. There is too much familiarity between the different grades. There is no uniformity of treatment or work in companies in the same garrison. The Academy discipline is discipline for boys during a formative period. It is

only a beginning, a foundation to build upon. It has but few of the elements of that higher discipline of which we have already spoken. Based on the hard, merciless system of Frederick, it makes but little impression on the heart or intellect, does not inspire a love of duty, gives rewards and punishments for the observance or non-observance of a host of petty regulations and orders, frequently without fully ascertaining the intent or spirit of the offender, which is the thing we desire to influence and correct.

Boys of seventeen and eighteen are punished as though they were men. A man's standard of work and duty is exacted, but they are allowed only the individuality of children.* It arouses antagonisms in the heart of the student which makes successful instruction impossible.

"Authority is composed of three elements: 1. Affection and moral respect. 2. The habit of submission,—a habit born of respect. 3. Fear."—GUYAU.

The first is the most effective and lasting, and the one to be cultivated above all others.

"Of all the changes taking place in education, the most significant is the growing desire to make the acquirement of knowledge pleasurable rather than painful. As long as the acquisition of knowledge is rendered habitually repugnant, so long will there be a prevailing tendency to discontinue it when free from the coercion of parents and masters. And when it has been rendered habitually gratifying, then will there be a tendency to continue without superintendence, that same self-culture carried on under superintendence. These results are inevitable."—HERBERT SPENCER.

This is a cardinal point upon which all educators agree. I dwell upon it because of its importance in the instruction of the soldier, whether he be officer or enlisted man.

There is no doubt but our method of instruction in discipline does arouse sentiments of repugnance and injustice, and create a prevailing tendency to discontinue it when relieved from coercion. Instruction in discipline should be theoretical as well as practical. The commandant of cadets should meet the fourth class in the lecture-room as soon as convenient, and give them an address, clearly defining their position towards their country, their chosen

* "In order that there shall be responsibility there must be liberty: responsibility rests upon liberty, and on it alone."—JULES SIMON.

profession and their instructors, whose comrades they are ultimately to be. Their duty to each should be explained in an earnest, kindly manner; they should be told that they are on trial to determine their fitness for the honorable and responsible career of an officer in our army; that every assistance will be given to them in their efforts to learn the duties and obligations of their profession; that the first duty of a soldier is obedience, not from fear, but from a love of duty and a spirit of loyalty to his superiors. He should strive to arouse their enthusiasm for their chosen profession, and to impress upon them that a soldier's career can be read in his official record, and his character in the esteem of his comrades.

A series of talks or lectures on discipline should be given each year. No course at the Academy equals this in importance; none leaves so lasting an impression on the mind and character of the student.

An English authority writing of Woolwich some years ago said, "Boys of 16 and 17 years of age need much personal supervision to form their characters, which young officers very often appointed without any sufficient knowledge of their tempers and habits cannot be expected to bestow. Such officers may indeed be able to superintend drill, but not moral teaching. Rarely do they draw cadets toward them, but rather repel them by a harsh and dictatorial manner."—Glieg's Essay on Military Education.

The Academy has at times been open to similar criticism. The instruction in discipline should be intrusted to officers of well-known disposition and ability.

It would be a safe rule to detail captains only to the command of cadet companies. What higher duty can there be in time of peace than the instruction of those who are to command in war? Having obtained men of the desired character and ability, they should be given control of the interior administration and discipline of their companies. By association and friendly intercourse with the students under them, they would learn something of the individuality of each; they could assist the weak by kindly counsel; the reasons for repression and discipline could be made intelligible to all those concerned. The moral nature of true discipline can be imparted only by individual instruction.

Class standing in what is termed "discipline" should be abolished. It is misleading and is not a fair indication of the results of instruction in discipline. It is a system of rewards and

punishments for behavior. Discipline for the officer cannot be crowded into such narrow limits. Neatness and order in person and in quarters are desirable and should be taught in a disciplinary way, but should not be paraded as the essential elements of discipline.

"Discipline must break the contrary and passive will, but only by exciting the positive and active one."—ARCHDUKE JEAN SALVATOR.

Drill and guard duty when performed under rigid conditions are excellent aids to instruction in discipline.*

It is doubtful if any improvement can be suggested in the disciplinary methods now in force at the Academy in all practical military work.

The officer appointed from civil life or from the ranks must be instructed in discipline by his captain and his post commander. The captain's influence over a young officer is very great. He will be a follower and will base his line of action upon the example set by his captain. It is therefore very important that the captain shall at all times be loyal, obedient, punctual and courteous. He must stimulate professional zeal if it is lacking. Industry is a military virtue. He must suppress all attempts at familiarity. Discipline goes out at the back door when familiarity enters at the front.

People who have Liberty and Equality for watchwords cannot be disciplined by methods common to monarchical governments, where caste is well defined, and respect for social superiors is the inheritance of long years of vassalage. The United States volunteer regards first, the power of law; second, ability, strength and dignity of character; the second becomes effective through a judicious application of the first.

Discipline forbids social intercourse between the soldier and his officer; it also demands that officers shall at all times exact the respect and courtesy due to their rank. If they conduct themselves so as to merit this respect and courtesy personally, as well as officially, the quality of discipline is improved.

The Regular Army is the model for the National Guard; it must be made as perfect as possible.

During his first years of service, the young officer must be guided by strong and skillful hands. His instruction in discipline should be conducted on the assumption that he is ignorant of the

* "Acts produce habits, and habits produce acts."—ARISTOTLE.

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meaning and methods of true discipline. It is not wise to assume that he is proficient in any branch of professional training.

PHYSICAL INSTRUCTION.

The present system of physical instruction at the Academy leaves but little to be desired. The cadet must be physically sound at the beginning and end of the course. Consequently the classes represent a searching physical selection from many hundreds of young men. Four years of regular diet, sleep, and exercise assist nature in her noble work. The gymnastic training (which should be continued through another year), coupled with athletic sports in moderation, enables the two National Academies to turn out groups of young men physically superior to those of other institutions. The introduction of foot-ball and athletic contests has done much to increase interest in athletics and physical culture throughout the army.

The most beneficial exercise is that which pleasantly engages the mind and body at the same time. A few more hours devoted to athletic games would still further improve our young men physically and mentally.

Descartes laid down the following rules for his guidance, and claimed that he followed them:—

"1. Never allot more than a few hours per day to thought which occupies the imagination—(concrete science and arts).

"2. Give only a few hours per year to work requiring the understanding alone—(mathematics and physics).

"3. Give all the rest of the time to relaxation for the senses, rest for the mind and exercise for the body."

Liebnitz said, "So far from our mental powers being sharpened by excess of study, on the contrary, they are blunted."

Sixty hours per week for study and recitation, from September first until June first, is too much for the best development of mind and body.

Our young officers join the service with good constitutions. Plenty of out-door exercise during the drill season and freedom from vicious habits will preserve them for many years of service.

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INTELLECTUAL INSTRUCTION.

*The Military Academy.**—The curriculum of an old estab-

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* A sound formal education is the indispensable prerequisite of a thorough military professional education.—Order of Teaching. War College, Berlin.

lished educational institution is the result of years of earnest labor and devotion, based on the accumulated knowledge and experience of all past time, and careful judgment as to the needs of present and future generations.

Buildings and an assemblage of instructors and pupils do not alone signify a great university. Traditions, customs, associations, long lists of distinguished alumni, give to life at old institutions an influence and interest not found in fledgelings. Educational statistics are of little value save to indicate that a certain number of instructors and pupils have passed so many days in school. A long catalogue of courses of instruction does not guarantee an education.

No institution can justly pronounce itself the best. Each pupil chooses the one he considers best adapted to his means and wants.

I have no intention of comparing the Military Academy with other institutions so far as its course of study is concerned. It has a definite and unvarying object, viz.: to procure from the young men of our country, those best fitted morally, mentally and physically to serve as officers of its army. As 85 per cent. of our officers are to lay the foundations of their future careers within its walls, its methods are of vital importance to the subject we are discussing. Its influence is impressive and lasting. Can it be improved?

The Academy is nearly one hundred years old; a century full of honors and usefulness. The present course is the result of the labors of men second to none in ability and devotion. The main fault of the Academy is its too rigid conservatism which retards its progress towards modern methods of education. Methods of instruction and aims in education have not been silent watchers of the world's great progress. They have not only joined the procession, they have increased its rate of motion.

The various departments of instruction were established by Acts of Congress and they can be changed only by the same power. The faculty is therefore denied that freedom of arrangement and power to experiment, so useful in other institutions. Radical changes even if desirable would be difficult if not impossible. I shall therefore confine my suggestions to some changes which in my humble judgment are rational, feasible and necessary to secure better results and more nearly meet the demands of the service.

Most philosophers agree as to the aims and object of education. "To encourage independence of thought rather than to amass a quantity of learning; to direct study rather to the strengthening of the powers of the mind than to acquiring the furniture of crudities," is the key-note of Locke's advice in "The Conduct of the Understanding."

"The beginning of all knowledge is observation, the goal of it, clear comprehension."—PESTALOZZI.

"The main duty of instruction is to give the mind a framework whereon to group the facts and ideas given it in the sequel by reading and experience."—GUGAU.

"In estimating the value of a branch of study, we must consider, not merely what it gives us but what through engrossment of our time it deprives us of."—BAIN.

We may divide instruction into two kinds:

1. That which has for its object mental training or discipline.

2. That devoted to the imparting of knowledge. The knowledge may be utilitarian, or it may be regarded in the light of an accomplishment. Kant's position seems unassailable, "to encourage independence of thought," and "to direct study to the strengthening of the powers of the mind" are certainly the fundamental ideas in modern education.

In a professional or technical school such as the Military Academy, the faculty has constantly before it the problem of dividing the time justly between subjects taught for training and those necessary to give the student a good ground knowledge of his profession.

A proper system of post-graduate instruction would simplify the problem. We have such schools for the engineers and the artillery, and all officers of these arms are required to attend them. We have excellent service schools for the infantry and cavalry, but it has not been made possible for all officers of those arms to receive the benefits of instruction at them, and the Academy must continue to supply the deficiency as well as it can.

The curriculum of the Academy was modelled upon the military schools of France. It is consequently largely given up to mathematics and the physical sciences. Gleig says "the despotic governments will foster from the outset the exclusive study of mathematics and the physical sciences, not only because they are necessary to an extensive acquaintance with the art of war, but

because addiction to such studies has a direct tendency to withdraw men's minds from the consideration of political questions."

The constitutional government not undervaluing the importance of scientific knowledge will be desirous of adding to it other acquirements which may be more interwoven perhaps with its civil than its military institutions, but which are not on that account the less important in its eyes. Shall we follow the despotic or the constitutional government?

Mathematics.—We have for many years devoted thirty hours per week throughout the course to the study of and the recitation in mathematics; pure mathematics for the first two years, and mechanics, astronomy, sound, light, engineering and ballistics the last two. Are we justified in giving such unusual time and importance to mathematics either on the ground of training or utility or both?

Doctor Holmes gives praise to the man "who has all the talents, *plus mathematics.*" [The italics are his.]

"Mathematics are so often thought by those who are ignorant of them to be the key to all reasoning, and to be the perfection of training. It is worth while to remember that after all they are only compendious and very limited methods of applying deductive reasoning. They no more teach reasoning than travelling by railway fits a man for exploring in Africa."—WILSON, M.A., F.G.S., F.R.A.S.

"Mathematics does not teach us how to observe, how to generalize, how to classify. Too exclusive devotion to it gives a wrong bias of mind respecting truth generally, and historically it has introduced serious errors into philosophy and general thinking."—BAIN.

I seriously doubt if the evidence for and against justifies our course.

In our technical schools six hours per week is the usual time devoted to recitations in mathematics. It would be difficult to ascertain the number of hours' study preparatory to recitation. Fifteen hours would, I am told by excellent authority, be a high average. Does preparation for military service require nine hours more per week for a longer period? From a utilitarian point of view, most emphatically no! Infantry and cavalry officers have but little use for mathematics. They are usually selected from that part of the class which shows but little ability or fondness for them; consequently the benefits they receive

from the study of them are not commensurate with the time devoted to them. It is also difficult to see why the artillerist and military engineer need so much more instruction in mathematics than specialists in other technical schools.

Is it the best training for the officer? It is purely deductive and is dogmatic and narrowing. It reasons from absolute rules and axioms. The reasoning of the officer in time of war is generally based on very uncertain premises. It does not awaken an interest in original investigation. It teaches one to regard quantity rather than quality. We must also take Bain's advice to heart and reflect seriously on "what we deprive ourselves of by this engrossment of our time." I consider twenty-one hours per week amply sufficient for instruction in mathematics, admitting that we must still pull the lower part of the class up to an unwelcome feast to do justice to the engineers and artillery. Certainly three and one-half hours per day, six days in a week, and for nine months of the year, ought to meet the requirements both for training and utility.

SCIENCE.

Mill speaks of "the indispensable necessity of scientific instruction, for it is recommended by every consideration which pleads for any high order of education at all. Reasoning and observation have been carried to their greatest known perfection in the physical sciences."

"For discipline as well as for guidance, science is of chiefest value."—HERBERT SPENCER.

"Science is the most perfect embodiment of truth. More than anything else does it impress the mind with the nature of evidence."—BAIN.

The unanimity of opinion among philosophers and educators as to the value and great importance of science both for training and utility makes discussion unnecessary. It must be given a prominent place in all schools. It is especially demanded in a school which is to fit men to perform the varied duties which fall to the lot of an officer in our army.

There are various opinions as to how science should be taught to make it most attractive and beneficial to the mind. Unfortunately time does not permit much practical work. Experimental and original work has to be omitted; the instruction must therefore be from books; not the most satisfactory method, but

necessary. Mechanics, chemistry, electricity, mineralogy, geology, heat, light, sound, and astronomy are essential in a comprehensive course of science. If the instruction is made pleasurable and an interest developed which will cause the student to continue his studies "when superintendence is removed," and to truthfully observe and reason upon those things which constantly surround him, we may say it has accomplished its object.

The question as to the proper division of time between theoretical and practical instruction is perplexing and does not admit of an exact solution. We have extremes of each. Some attention must be given to the student's capacity to digest and assimilate knowledge; otherwise, instruction becomes a mere cramming process, hurtful to the recipient. The capacity of every human mind is limited, and when that limit has been reached in any given subject new material can gain lodgment only by displacing other (and perhaps more useful) knowledge.

It is not the purpose of the Academy to educate specialists in any branch of science or literature. Consequently, a good strong foundation in theory is sufficient. If practical work can be added without detracting from the thoroughness of the theoretical, it will be interesting to a great many students, will possibly create a fondness for original investigation, and improve the powers of observation and discrimination; certainly, very valuable qualities for the officer. Very great care and wisdom must be used in determining the quantity and quality of the practical work, glibly talked about, but little understood by critics of the Academy. We must "make haste slowly." The able men who have the matter in charge are fully competent to arrange it for our best interests.

Drawing is essential in a military school. Every officer should be able to make a rapid field sketch. It need not be a work of art, but it should be neat, accurate and easily read. He should also be able to make a neat and accurate mechanical drawing. If time can be found for instruction in free hand drawing and landscape sketching, it will be a great advantage. It is a refining and graceful accomplishment, and nothing teaches one to carefully observe the ground so much as an apprenticeship to the landscape artist.

"For the purposes of intellectual and artistic education, it needs to be supplemented by drawing from nature, else it fails to exercise its peculiar powers as a stimulus to observation, to

purity of taste, and to appreciation of natural beauty."—THOMAS HILL.

LANGUAGES.

What languages shall we teach? Evidently our own first and most thoroughly. The nine hours per week that I have suggested as being necessary for mathematics, might with great profit be added to the time for study of the English language and literature. We have fallen behind other institutions in this respect. It appeals to us from two points of view,—utility and accomplishment. It is absolutely essential to a liberal education. Language and thought go together, a study of the best thought begets power to think, and power to think precedes power to act. The officer needs power to think and act quickly and correctly, and capacity to express his thoughts clearly, verbally, and on paper.

The entrance examination in English (fixed by law) has a discouragingly low range. We are forced to start at a much lower standard than that accepted at any other college or technical school. As a change in the law is barely a remote possibility, we have much to make up to place our product on an equality with that of sister institutions.

We should teach grammar, rhetoric, English composition and literature. The time deducted from mathematics could very profitably be given to the department of languages. An officer has much time for reading and self-improvement. It is our duty to conduct his early instruction, which lasts but four years, so that his self-instruction which is to continue throughout his years of service, shall be both profitable and pleasant, and round him up to the stature of the full man.

Contact with men of liberal education teaches us not how much we have learned but what we have been deprived of by an engrossing apprenticeship to mathematics.

For many years each Board of Visitors has criticised the cadets' use of English. Comparison frequently demonstrates that their English is quite as good as that found in the report of the board. Grant, Sherman, Jefferson Davis, Captain King, Professor Hardy, and many others, have written very readable English, and the many scientific works written by graduates need not fear comparison with those produced by graduates of other institutions.

Space does not permit further argument for an increase of time for the study of English. With small classes and a rigid

system of work, all students can be taught to write and speak good English, and be given sufficient knowledge of their mother tongue to direct further research into its vast and ever varied domain.

What other languages shall we teach?

It is the general opinion among educators not exclusively devoted to the classics, that the study of foreign languages can be approved only on the ground of utility. "That their main if not their sole justification is, that we mean to use them as languages, to receive and impart knowledge by their means."—BAIN.

This view appeals to us for the following reasons: 1. The course is now crowded to the full capacity of students. Nothing can be added until something has been subtracted; 2. Our language is being acquired by the entire world with amazing rapidity, and one can travel around the world quite comfortably without knowledge of any language but English.

If we have time for two foreign languages, French and German are evidently the ones to be selected. They are the richest in general literature; are most generally taught in schools at home and abroad, and next to English most prevalent throughout the world. As France and Germany are the two most powerful military nations of the world, their military literature is the most valuable to the student of the art of war, and should be within his reach. It is not necessary nor is it possible to give students a speaking knowledge of these languages in the time we can devote to them, but two years of careful instruction will give a good reading knowledge of them and will suffice on the ground of utility.

To sum up: the first two years of instruction should cover the following subjects; pure mathematics, English grammar, rhetoric, composition and literature, drawing, French and German. The day should be divided as follows; eight hours for sleep, one and one-half hours for meals, nine hours for study and recitation; one half hour for work in the gymnasium; one hour for drill and military exercises and four hours for reading and recreation. Saturday afternoon and Sunday to be added to the time for recreation. This is certainly a fair division of time and labor both for the student and for the Government which has a right to demand his best efforts.

The instruction in English literature should endeavor to encourage students to adopt systematic courses of reading.

The third year must be devoted to the study of science on the lines already laid down. Drawing to be continued, as two years' instructions will be necessary to accomplish our purpose.

Having devoted three years to the study of science and literature, the fourth must be devoted to professional subjects. It has been suggested that the class be divided at the beginning of the last year and separate courses be established, one for the engineers and artillery and one for the infantry and cavalry. This would not be wise. Our military policy demands that our officers be instructed for duty in all arms of the line.

Sheridan was in the infantry when the war opened; Howard was in the ordnance; McPherson was an engineer. If war should come upon us now we should have to increase our cavalry and our field artillery. We should need trained officers for them at once, and would have to draw them from the infantry, as we could fill vacancies in that arm more acceptably. An officer in our army can hardly foresee the nature of his service in time of war; his training must therefore be broad and extensive.

What professional subjects shall we teach; we have only utility to consider?

1. Military and civil engineering; it is essential that all officers be carefully trained in elementary engineering; 2. Constitutional law; (We live under a constitutional government in which military power is subordinate to civil power. The frequent use of the army in suppressing strikes and the consequent conflict between civil and military authority requires that officers be well informed on constitutional law.) 3. Military law; 4. International law; 5. Ordnance and gunnery, ballistics, explosives, and material of war; 6. Military history*; I deem it of great importance that this interesting and very valuable subject be introduced into the academic course. "It is the most fruitful of all sources of information."—NAPOLEON.

It is the foundation of our art, the basis of our profession.

"The principal object of the study of military art is to perfect the intelligence and the judgment of officers by combining study with the most extensive use of their moral faculties. This object is attained only by using the lessons of experience.

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* "The lectures upon military history offer the most effective means of teaching war during peace."—Order of Teaching. German.

"They will acquire a high value if the teacher succeeds in bringing into exercise the judgment of his pupils."—*Ibid.*

"The study of military history ought not to be extended to epochs which offer no characteristic bases for the conduct of actual war. They should characterize the military art of the nineteenth century; familiarize officers with the true life of armies in the field; prepare them to keep the head clear and the heart warm in danger; finally, to exalt incessantly the sentiment of patriotism."—GENERAL DE PEUCKER.

We cannot imagine a subject more interesting or more useful to the young soldier. With very limited time at our disposal we need not go back of Napoleon's time. His campaigns, the War of the Rebellion, the Franco-Prussian and Russo-Turkish wars, will furnish ample material for a one-year course. We can give more time to it in the post-graduate courses, but we must do something for those who are not to have the advantages of post-graduate instruction. We can at least teach cadets how to study military history and arouse an interest in it which will cause a continuance of the good work. It is recommended by every reasonable consideration.

7. The art of war to include minor tactics, logistics and strategy. The time could be divided as follows: First term, September to January; daily one and one-half hour recitations, and three and one-half hours for study of the art of war; two hours for study and one for recitation in law, to alternate daily with ordnance throughout the year. Six hours per week, two for recitation and four for study, can be given throughout the year to military history. From the first of November to the middle of March, the climate prevents out-of-door drills; two hours per week of the time usually devoted to drill can be given to lectures. The post-surgeon should have the first two months for lectures on anatomy, physiology and hygiene, sanitation, first aid to the wounded, etc. Sickness is the great destroyer of armies. In the event of war our men will be hastily drawn from the office, the counter and the workshop; unhardened to exposure and fatigue, they quickly succumb to disease, often contracted through lack of knowledge of ordinary sanitary precautions. In the future, even more than in the past, victory will come to the army which can manœuvre the most rapidly. Power to manœuvre means capacity to march, and capacity to march depends upon the physical condition of the men. General de Brack says: "It requires more skill to keep men in condition to fight, than to conduct the fight."

Three hours per week from the first of January until the drill season opens, should be given to the Department of Tactics, for lectures on minor tactics, discipline and customs of the service.

I have given a summary of what I consider a proper and feasible course of theoretical instruction during four years of academic life. It is impossible to do more and leave space for the more important years to follow. The practical instruction must keep abreast the theoretical. During the first year it must be confined to instruction in the duties of a private in the drill regulations for artillery and infantry, gymnasium work and swimming, under the instruction of the master of the sword. In the second year the student should acquire a knowledge of the duties of corporals and commence his lessons in riding and horsemanship. The importance of the non-commissioned officer on the field of battle has greatly increased. It is demanded that every cadet be thoroughly drilled in all of the various duties of non-commissioned officers. It must not be confined to the few who may be selected to wear chevrons. Rational instruction never loses sight of the object to be attained, which is in this case the equal preparation of all for the duties and responsibilities of commissioned officers. During the third year instruction in the duties of sergeants will be in order, and in the fourth the duties of lieutenants.

Instruction must be progressive and varied; the quantity is not as important as the method and the quality. The reasons for the different schools and movements should be clearly explained. The instructors must remember that they are not simply aiming to perfect drill in order to make a fine showing before distinguished visitors, but are aiming to develop leaders and teachers for our army. To progressive instruction in infantry, cavalry and artillery drill we must add field engineering, bridge building, signalling and target practice. There is also time during the encampment to teach first-class men the elements of foot and mounted reconnaissance, outposts, patrols, advanced and rear guards, and route marches.

The encampment should be devoted to practical work, with a liberal allowance of time for rest and recreation.

We cannot leave the subject of academic instruction without a few words on the method of getting work from cadets.

Effective organization demands that the rank of every officer and man in an army be definitely fixed by law. The law fixes the second lieutenant rank of classmates on their class standing; it

also affects their choice of arm of the service, and consequently their entire future career in the army.

The system of emulation is therefore developed to the highest degree. I am aware that the system is necessary and to a great extent desirable, but it can and should be modified so as to increase the desire for knowledge and weaken the struggle for marks alone. Bain says: "Emulation is the most powerful known stimulant to intellectual application. Its defects are (1) it is an anti-social principle; (2) it is apt to be too energetic; (3) it is limited to a small number; (4) it makes a merit of superior natural gifts." The question is whether a more moderate pitch of excellence, such as befits average faculties, could not be attained without that stimulant.

Most of our large universities have adopted the latter view. Class standing is not a true indication of soldierly ability; the War of the Rebellion demonstrated that in many cases. It is, however, the only practical method of determining the relative capabilities of young men at this period in their lives.

The injury is done by placing before the student his daily marks in each subject. He soon acquires the habit of working for marks alone and of estimating the value of the instruction upon the marks he receives instead of upon the knowledge and the mental discipline. I think the daily marks should not be published and that class-standing should be announced only after the semi-annual examinations. If any members of a class are doing poorly it will be a simple matter for the instructor to warn them that they must improve in their work. We have become so infatuated with the marking idea as to carry it into our post-graduate schools, and we have seen the sad spectacle of a war veteran competing, on a scale of three, with a "youngster" just out of the Academy.

The changes I have suggested in our academic instruction are feasible and from my point of view necessary to bring it up to a higher pitch of excellence, and that it may more nearly fulfill the hopes of its friends and disarm the criticisms of its enemies.

We might institute comparisons with the curriculi of foreign military schools. It would not mean much. The entrance conditions are so different, the objects so varied, and the service requirements so extensive, as to give us but little just basis for comparison.

To recapitulate; I have suggested the following changes:

1. A more rational and comprehensive course of instruction in discipline and *morale.*

2. A reduction in the time devoted to mathematics, and a transfer of that time to instruction in English literature, French and German.

3. The introduction of theoretical and practical work in minor tactics.

4. Suppression of the publication of daily marks.

5. Progressive instruction for all cadets in practical military work.

6. The introduction of a course in military history* in the senior year.

7. A little more leisure time for reading and athletic games, which refresh and stimulate mind and body.

POST-GRADUATE INSTRUCTION.

Upon completing the course at the Academy, the young officer should be assigned to a regiment for duty with troops. After two years' service with his regiment he should have an opportunity to attend the special school for his arm of the service. The two years of rest from severe mental exertion will be refreshing and beneficial without destroying the power of application to study.

The young officer will have had some experience in his chosen arm and should welcome the opportunity to perfect his knowledge of his profession; he will be on terms of equality, possibly of friendship with his instructor, he will not be subjected to useless and galling restraints; he will be ambitious to avail himself of every opportunity for advancement, and he has a good strong academic training as a foundation; furthermore, he will have arrived at man's estate, and a serious view of his duties and of the possibilities in which he must be prepared to take a part. He will no longer be an unwilling student held to his tasks by force; the development of the *morale* of the officer (the most powerful factor in war)† has already begun; the instructors have

* "There does not exist and never has existed * * * an 'art of war' which was something other than the methodic study of military history."—COL. MAURICE. Enc. Britannica.

† "Moral force is three-fourths in military affairs; other forces one-fourth."—NAPOLEON.

"No! the secret of victory does not reside in instruments of destruction. It is a power old as the world, yet always young, more redoubtable than arms; apt to give

but to direct the growth of powers and qualities already in evidence.

These are ideal conditions. If great results are not attained the fault must lie in erroneous methods of instruction or in the incompetency of instructors.

There are, unfortunately, some weaklings devoid of a just appreciation of the obligations, dignity and honor conferred on them by a commission, who fritter away the golden opportunities. They should be warned by the War Department that lack of interest and proper zeal may lead to their dismissal from a service to which they bring no credit.

A generous emulation will be the incentive to work. Compulsion may be replaced by a generous allowance of liberty.

Knowledge, instead of marks, will be the reward of earnest effort.

The method of instruction is of first importance. Mere recitation from text-books should be avoided. Instruction should be by lectures, demonstration by the instructor, discussions, quizzes and theses. The individuality of the student must be recognized. "Every educator now recognizes that individual characteristics are always sufficiently marked to demand his earliest attention, and there is a stage in the process of education, where the choice, the responsibility and the freedom of the individual should have a wide scope."—PROF. HARDY.

Progress in war, is the result of originality in study and research of the records of the past, made apparent by action in subsequent events.

Students who are especially efficient and zealous should have their names sent to the War Department, but class standing, except to show the "proficient" and "deficient" should not be published.

Great care should be exercised in selecting instructors. "The method of instruction is the instructor."—GUNDRE. Exhaustive knowledge, patience, zeal, firmness and experience are the essential qualifications; they are rarely found in a single individual, but when found in an officer, the schools should have the benefit of them as long as the possessor is willing to give them.

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birth to great surprises, because it creates in an hour the most unexpected means of action, the most varied artifices, applying them to circumstances with admirable precision. It is Moral Power resulting from three forces: the Intelligence which conceives; the Will which executes; the Courage which faces death."—COLONEL MAILLARD.

There cannot be a very wide difference of opinion as to the courses of instruction at the various schools, as the range of knowledge for proficiency in a particular arm is fairly well established. At the engineer and the artillery schools all pupils have had the same training, and the new instruction should begin where the old ceased. At the infantry and cavalry schools the course has to be adapted to different conditions of previous training, which makes its problem a little more complex than the others. The honor system should be dropped. It is wrong to encourage a few at the expense of the many. It may be an excellent incentive for youths ; it is unnecessary and harmful when applied to officers, because it seldom considers moral qualities and strength of character, which are vastly more important than the capacity to acquire information.

A letter should be placed in the Army Register after each graduate's name to indicate the school he has successfully passed through ; as, (I) for the infantry and cavalry school, (A) for the artillery school, (C) for the cavalry and light artillery school, and (E) for the engineer school.

THE ARTILLERY SCHOOL.

By the progress of events in which the artillery has played no little part, it has become the most scientific arm of the service. If we were to judge the progress of science and invention in the last thirty years by the changes in the material of war alone, we might well wonder at the power of intellect.

So far as the artillery is concerned, we may truthfully say, " former things have passed away." The muzzle-loading smooth-bore gun has been replaced by the breech-loading rifle, which makes shrapnel deadly at 3500 yards. The Rodman gun on its slow-working carriage is a plaything compared to the powerful engines of to-day, mounted on disappearing carriages and capable of throwing 10,000 pounds of steel in twenty minutes. The pot-metal keg on a clumsy iron base has given way to a 12-inch breech-loading rifled-steel mortar on a self-acting carriage ; guess-work has been superseded by complicated range-finders and relocators and electrical apparatus for tracking moving objects ; the old black powder which, unchallenged, played such a leading rôle in the history of the world for five hundred years, will in the future appear only in the books beside the names of its victims ; scores of smokeless powders and high explosives are now in ex-

istence; rapid-fire guns of six-inch calibre and machine guns firing 1200 shots per minute contribute to the perplexity of war.

A system of instruction which will make an officer expert in the use of all of these destructive agents must be extensive and laborious. We make no classification. Our artillery officers must be prepared to command light batteries in the field or sea-coast fortifications, as circumstances may elect.

It is impossible to cover the ground thoroughly in two years. The light-artillery sub-school at Fort Riley was very necessary to relieve the congestion of the Fort Monroe school, which should be a practical school for heavy artillery. The instruction at the school is directed by the staff, which consists of the commandant, the two other field officers of artillery on duty at the post, and the commanding officer of the Fort Monroe arsenal.

At the Royal Artillery College, Woolwich, six of the fifteen instructors are noted civilian experts in chemistry, mathematics, electricity, guns and armor, etc. We should have similar men in charge of the departments of electricity, chemistry and mechanical engineering. I do not intend to reflect in the slightest way on the zeal or the ability of the officers who have had charge of those departments in the past; the positions are temporary and officers newly assigned to them do not always bring much practical experience; no man can do justice to two or three professions at the same time. The prestige and influence of a school, and consequently its value to the student, are greatly increased by the addition of celebrated men to its corps of instructors. They inspire the student; they have his confidence and respect; they give a value to knowledge by the added weight of their authority, which enhances its importance in the eyes of the student and increases his desire to acquire it.

We shall not get the best results from these schools until the methods of instruction and the abilities of the instructors shall have reached a standard and acquired an influence which will cause young officers to eagerly await and gladly welcome their selection for the detail.

Tedious and dogmatic instruction in theory must be avoided. To cultivate moral and mental qualities; to increase judgment; to direct individual effort; to form a base for future self-instruction and awaken a love for work (the indispensable attachment of a solid education), are the rational objects of all military instruction. They should constantly be kept in view.

The lecture system should be employed in every department not purely mathematical. It requires a higher order of ability in instructors than recitations from text-books, but the results obtained with students of mature age, actuated by a desire to learn, are better and more lasting.

Theory should be confirmed and fastened in the mind by practical work. In topography, military and mechanical engineering, chemistry, electricity, submarine mining, signalling and photography, the instruction should be almost wholly practical. To facilitate practical instruction in fortification and heavy artillery, the school should be located in or near a modern sea-coast fortification containing types of the most recent guns, howitzers, mortars, carriages, search-lights, range-finders, and other heavy artillery material. The school should be liberally supplied with books, maps, models, apparatus and machinery, that students may have every facility for practical work and original investigation.

All ordnance officers should be graduates of the artillery school. If they have not been through it when transferred, they should be sent at the beginning of the next school year for special instruction in chemistry, metallurgy, explosives, mechanical engineering and electricity and ballistics. They should have special opportunities for visiting such works as the Naval Gun Foundry, the Bethlehem and Carnegie Steel Works, the Winchester Repeating Arms Company, the Providence Tool Company, etc. They should be required to turn in written reports on the management, economy and administration of these establishments.

It is not worth while to go into a detailed discussion of the course of instruction; it is clearly specified in the annual catalogue, and comprises the following subjects: military engineering, steam and mechanical engineering, exterior and interior ballistics, employment of artillery, artillery material, munitions, armor, etc., electricity, submarine mining and torpedoes, military science, chemistry and high explosives, cordage, telegraphy and photography.

This is an extensive list of subjects to be completed in two years, but when we remember that the students have already had good instruction in some of them, and that they have been selected from the upper halves of their classes at the Academy, it is not beyond their capacities.

This makes instruction comparatively easy. We rarely find classes with all the members so nearly equal in ability and attainments. With good methods the progress should be rapid and uniform. Practice should dominate theory; principles should be fastened in the mind by practical illustration.

"It is better to show once than to explain twenty times."—DRAGOMIROW.

"There is a considerable interval between the knowledge of principles and the faculty of using them in making resolves. The method of instruction ought to tend to suppress this distance. It is by this method that the officer succeeds in acquiring the energy and force of will so important in war service."—GENERAL DE PEUCKER, late Inspector-General of Military Instruction in Germany.

Military history and hygiene are noticeable omissions from the course. It might be argued in favor of these omissions that strategy, tactics and military hygiene are not especially necessary to heavy artillerymen who fight only in fortifications, and are not exposed to the hardships of infantry and cavalry service. We must bear in mind that we have no heavy artillery corps yet, and our military policy demands the general preparation of all officers for any service it may be convenient to assign to them. Whatever reasons may be given for omitting military history from the West Point course, there can certainly be no good ones for omitting it from the post-graduate courses.

We want to cultivate military judgment; why not go to the fountain-head? It is much better for the student to draw his own conclusions from the facts, than to be constantly accepting them second hand. We want to encourage individuality, independent thought, love of action, reason, and quickness of perception. I know of no single subject so well adapted to arouse enthusiasm in instructor and pupil. Its lessons are inexhaustible and ever new.

The courses of instruction are prescribed by the staff. They should not be so rigid as to deprive instructors of personal initiative and reasonable originality of method. The efforts of the staff should be directed towards securing unity of purpose, equalization of opportunities, and a just division of time and means.

Discipline must be rigidly enforced; it must ever remain the most important subject. Student officers should be attached to batteries for instruction in drill and discipline.

However much we may differ as to methods, objects, and courses of instruction, we will agree that if the present course is pursued with the zeal and determination characteristic of the worthy officer, his knowledge and efficiency, and consequently his value to his country, will be greatly increased.

Until the artillery arm is increased it will be necessary to send officers to the school a second time to make up the complement of students.

Under no circumstances should an officer be required or permitted to pursue a second time a course of study in which he has once been declared proficient. A second detail should be a privilege to pursue a higher course of study and investigation in some special feature of artillery service or material.

Candidates for a second detail should apply through their post and regimental commanders, stating definitely their reasons for applying and what they hope to accomplish if the privilege is granted. The War Department should make the details upon the records of the applicants and the importance of the work they hope to do. Their work should be done under the direction of the staff of the school and they should be required to conform to the regulations for discipline and duty prescribed for other students.

The reputation of our countrymen for fertility of resource and originality in invention is world-wide. We can well afford to devote some of that talent to original work in military science.

THE INFANTRY AND CAVALRY SCHOOL.

It was founded in 1881, and assumed the artillery school regulations and methods for its early guidance. In common with all schools it was crude and unsatisfactory at first, but through the devotion and ability of its superintendents and instructors it has reached a high state of efficiency. It is greatly to be lamented that it cannot be expanded to give to all lieutenants of infantry and cavalry the advantages it offers to a few.

Since its organization about two hundred and thirty officers have been graduated, an average of but sixteen per year.

The remarks made on previous pages on methods and aims of instruction apply with equal force to this school. Its chief value will come from its practical instruction, and its effect on the discipline and *esprit du corps* of students. It has a definite

place in our system as a practical school for infantry and cavalry lieutenants. It is not wholly a post-graduate school, as many of the student officers have been promoted from the ranks or appointed from civil life. It is therefore necessary to take them through much theoretical work from which graduates of the Academy should be exempt.

In par. 33, of the programme of instruction, we find the following astonishing information:

"The staff in its final decision as to the proficiency and relative standing of each student shall take into consideration the mark received for practical exercises, which shall have a value in each department as follows, viz.:

Military art (including essay),	100
Engineering,	150
Infantry,	33
Cavalry,	33
Artillery,	33

In par. 44, we find the following, viz.:

"The maximum values to be assigned to the different departments, in ascertaining the figure of merit, shall be as follows:

Dept. of Military Art (including practical exercises),	300
Dept. of Engineering (including practical exercises),	300
Dept. of Law,	150
Dept. of Infantry (including practical exercises),	100
Dept. of Cavalry (including practical exercises),	100
Dept. of Artillery (including practical exercises),	75
Dept of Military Hygiene,	50

A glance at these values leads to serious reflection. Are the departments of infantry and cavalry in their special school only one-third as important as engineering and military art and less important than law? Have we not a right to assume that the fundamental object of this school is to teach student officers, first, all the duties and functions of their own particular arms, and then such accessories as time and circumstances may permit? Fortification, topography, signalling and photography are adjuncts to a military education, but we cannot for a moment admit that they are even equal in importance to the training and instruction of the young officer in the minor tactics, administration, and discipline of his own arm.

The sequel to this low rating is found in the undeveloped condition of these important departments.

The Department of Infantry includes:

Part 1. Infantry Drill Regulations. (Theoretical and practical.)

Part 2. Infantry fire and its uses in battle.

The Department of Cavalry includes:

Part 1. Cavalry Drill Regulations. (Theoretical and practical.)

Part 2. Equitation.

Part 3. Hippology.

In the detailed programme of studies for the Department of Military Art, we find the following subjects: military policy and institutions (4 sub-divisions); strategy (24 sub-divisions); tactics (17 sub-divisions); logistics (5 sub-divisions); military geography (5 sub-divisions); staff duties and administration (8 sub-divisions); exercises in application, with and without troops; without troops consisting of, 1. Field service exercises; 2. Manœuvres on the map. If this course is thoroughly taught there will not be much time for individual training in infantry and cavalry, and the name of the school should be changed to War College, and it should be opened to officers of all arms.

It is the old West Point idea that in case of war we are all to be generals; consequently, strategy, grand tactics and logistics usurp the time and labor which rationally belong to the company and the battalion. We do not seem to be able to overcome a desire to begin at the top instead of at the bottom.

The sentiment of the service for the Leavenworth School will be more kind, details to it will be more eagerly sought, and the antagonistic feeling so common to students which makes good instruction impossible, may be overcome when it is put in rational accord with the object of its existence; when the departments of infantry and cavalry are put at the head of the list instead of at the bottom, and the other subjects are grouped about them as accessories in the order of their importance.

The tendency of an elaborate system of theoretical instruction is to make war appear complicated and abstruse; and to divert the attention of the student from his present rank and duties, to an idle contemplation of the remote possibilities of the future.

All of our schools have suffered severely through the lack of good instructors.* An order to instruct has been deemed all

* To fulfill the functions of an instructor, it is not sufficient to know theory, nor

that was necessary to make an instructor; consequently the school has had to instruct both student and instructor. The text-book which could be closely watched became of necessity the boon companion of the instructor, and the system became dogmatic, uninteresting and irksome to the last degree. In some cases the instructor brought less experience and but little more knowledge into the section room than some of his pupils; he could not possibly exert any beneficial influence over them, and necessarily retarded the progress of the school. That our schools survived the scourge was due to the fact that having been created by order, the *coup de grace* could be given only in the same way.

It is no disgrace to say of an officer that he is not a good pedagogue. Teaching as an art can be acquired only by long years of experience. If a man has no fondness for it and lacks the personal characteristics which win the students' esteem and confidence, he will never succeed. It is remarkable how very few really good instructors are found among men who adopt teaching as a profession.

When we find a first-class instructor, we should keep him. His services are of vastly greater importance in assisting in the training of young officers than in doing routine garrison duty.

During the first year the infantry officer should be instructed theoretically and practically in the principles of combat, advanced and rear-guards, outposts, patrols, drill regulations, marches, escorts, reconnaissance, administration, fire tactics and fire discipline,—for infantry alone. Beginning with the squad he should progress to the battalion. Company and battalion commanders control the fighting line, and consequently the fate of the day. Generals will have but little control or influence over the fight after the men are once in; the secret of modern military training is to make the battalion perfect. A similar course should be established for cavalry officers, with the addition of equitation and hippology. As the cavalryman has more to learn than the infantryman, the Government has a right to demand more labor from him. These departments should be

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even to recite it with faultless rhythm. Teaching is one of the most difficult arts; it is acquired above all by practice."—*Journal des Sciences Militaires*, 1888.

"To be instructor means, being given a principle, to know how to deduce by reason its practical applications; it is still further to know how to teach this reasoning to others so that they shall be able to apply it again under all circumstances."—*Ibid.*

called the departments of infantry and cavalry; they should be the most favored and count most in the order of merit. In estimating the capacity and ability of a student for practical work, discipline, zeal, simplicity and individuality and a desire to succeed should count three points, as against one for knowledge of the book.

During the winter months, regular out-of-door work will be impracticable. Systematic theoretical work will then be in order. For this work the class should be divided into two sections; one section to contain graduates of the Military Academy who have once been declared proficient in law, ordnance and gunnery, drawing, civil and military engineering; the other to contain officers who have had no theoretical instruction in those subjects. It is not possible to put both sections through the same course and do justice to both; either one will be unjustly retarded, or the other unduly advanced. To relieve the school from this difficulty, officers appointed from the ranks or from civil life should report one year sooner than the other members of the class to be taught the subjects mentioned above. All could then begin the regular course on the same footing.

During the second year the practical work should be a continuation of the work of the first year, practical field engineering, combinations of the arms in minor tactics, infantry and cavalry, infantry and light artillery, cavalry and light artillery. A squadron of cavalry and two batteries of light artillery should be stationed at the school.

Two years careful observation of the practical work of the students will give a just basis for judgment as to their qualifications for duty in the arms to which they have been assigned. A cavalry officer poor in horsemanship, slow in action, or lacking the physical and mental qualities that give energy and enthusiasm, should be recommended by the staff for transfer to the infantry. An infantry officer of not over three years' service, who desires to be transferred to the cavalry, should upon entering the school file his application with the Secretary of the school; at the end of the course, the staff should endorse upon the application, its opinion as to the advisability of the transfer for the best interests of the service. Some of the flagrant errors made in the first assignments can thus be corrected. Personal preferences are of little weight compared with the efficiency and reputation of the army.

Theoretical instruction should be given, first in those things which can be fastened in the mind by practical application. The extra time can then be wisely devoted to military history, the art of war, tactical problems on the map, war games, staff duties, and essays on military topics assigned by the instructor.

The Government is entitled to eight hours per day of honest labor from its employés; it can justly demand more than that from young men who will probably have many years of comparative ease.

It seems incredible that an officer should be so lacking in pride as to permit himself to be declared "deficient" in a service school. There should be a section in the Revised Statutes to read as follows:

Any officer of the Army of the United States, who, through wilful neglect, lack of application, or from want of ability, shall be declared deficient by the staff of any military school of the United States, shall be dismissed from the service.

The Leavenworth School is an important link in our chain of instruction. Its influence reaches deeply into two great arms of the service; in a few years its graduates will attain rank and command; how essential it is that its instructors shall grasp the spirit and methods of the new instruction, which places discipline, loyalty, zeal, determination to conquer and self-confidence first; daily training in all of the details and duties of one's own arm, second; and last, such accessories as may be considered necessary as preparation for high command, or for adding to the accomplishments and general usefulness of the officer.

Zealous devotion to the duties and opportunities of the present is the best preparation for the future.

THE CAVALRY AND LIGHT ARTILLERY SCHOOL.

It was a happy thought that inspired the founding of a joint training school for these sister arms of the service. It is also fortunate that its rational place in our system has steadily been kept in view, and that it has not been enticed into the mazes of text-book instruction, but has remained what it should be—a practical school.

The spirit of these arms is, action, initiative, celerity. The same spirit must be the dominant feature in the teaching. The recommendations of its commandants are the best guides for its treatment by the War Department.

It should have three squadrons of cavalry of four troops each, taken from different regiments; a battalion of light artillery and two horse batteries. Each troop and battery should remain three years. They should have constantly their full complement of officers, and an officer detailed to the school for instruction should not be taken away, except in pressing emergencies, before he has completed the course. All additional second-lieutenants in these arms should be sent to the school.

As this is a school for the training of non-commissioned officers and men, the troops should be kept on a war footing and should not be sent on detached service until other possible details have been exhausted.

The scheme of instruction is clearly set forth in the annual report of the commandant, and need not be repeated here. Three days per week during the drill season should be devoted to practical exercises in minor tactics; the two intervening days should be given to close order movements which perfect the discipline and solidarity of officers and men. The last two months of the season should be devoted to combined operations of the two arms and of the three arms, the scheme will be described later.

The theoretical work should be confined to lectures on the history and development of cavalry and artillery and their tactical uses. The principles laid down should be practically illustrated on the ground at the first opportunity. The Lyceum should be a tactical school for officers, the main features of which should be the study of tactical problems on the map or on models of clay or sand; discussions of campaigns in which cavalry and artillery played leading rôles, and essays.

Marks and order of merit have no just place in this system. The number of students is so small that their proficiency can readily be determined by observation of the interest and zeal they put into their work. The names of those who show unusual aptitude coupled with the enthusiasm and energy so necessary to a brilliant career in either of these arms should be sent to the War Department.

The lazy and indifferent should also be reported for reprimand, and they should be warned that at their next examination for promotion they will be required to show satisfactory knowledge of all subjects taught at the school.

Here as elsewhere the method and the spirit of the instruction

are most important; determination, rapidity in thought and action, dauntless courage and an *élan* that never flags, are the qualities found in such men as Sheridan and Stuart. All young officers possess these qualities to some extent; they must be stimulated by personal instruction and by example.

The young officer will also need instruction in discipline—the true discipline of the officer—"a quality of heart and will." Example is the best teacher; friendly but firm control by his company commander, the counsel of his superiors and the study of the lives of great soldiers, are valuable aids to instruction.

THE STAFF.

I cannot devise any logical or feasible system of instruction for the staff under the present organization. A radical change is hardly a remote probability. When we reflect upon the influence which staff officers have had on battles and campaigns, we are strongly impressed with the importance of filling these positions with men of the highest professional ability. A young galloper suggested Bredow's charge. Lee's "lost order" gave the Federals much valuable information. An aide was sent with Napoleon's order to Vandamme in June 1815. His horse fell in a ditch and the order was never delivered. Whether it was his fault in going alone, or that of his chief-of-staff, in permitting him to do so, is immaterial.

We should have a flexible instead of a rigid staff. We should be instructing a number of officers in general staff duty. At stated periods they should be returned to the line and be replaced by others. A War College would be an essential part of such a system. Under the present system we must rely on the service schools. They can give some instruction to men above the average of the ability of their classes.

If examinations for promotion were extended to include the grade of colonel, staff officers might be required to show an extensive knowledge of military science and to retain an active interest in the affairs of the line.

SERVICE TRAINING.

The school instruction outlined in the preceding pages occupying but six years and usually completed before the age of thirty, is but a prelude to the work which must be done during all the remaining years of active service. The importance of the school in the formation of character, mind and body, is very great.

The knowledge acquired from books is evanescent; but mental and physical characteristics are tenacious. Youth is impulsive and radical; age is thoughtful and conservative. Impulsiveness softened by judgment, and rashness tempered with discretion are admirable soldierly qualities.

The charge is laid against us that we are rapidly becoming a theoretical army, and it is not without some just foundation. It is a grave charge and the reasons for its existence should be answered.

Daily practical work in every camp and garrison is now believed to be the only safe preparation for war.* It is the principal method employed in the great continental armies which are being prepared to struggle for the existence of great nations. That great and invaluable training-school,—the frontier,—has practically disappeared. We have no quarrelsome neighbors or restless colonies upon whom we can periodically practice our art. It is hoped that in a few years the National Guards of all the States will be fully competent to enforce their laws without assistance from the Regular Army; consequently we are, or soon will be, thrown upon our own resources for that practical knowledge and experience so necessary to successful command in war. With these facts in mind, I repeat with emphasis that the service training of the officer should be practical work in all of the details of his profession, from the "school of the soldier" to armies against armies.

It is well known that the officers who attained the highest command in the War of the Rebellion were taught in the greatest of all schools—experience in war. They took part in the Mexican War or in war against the Indians on the frontier or both. It will suffice if I mention Grant, Sherman, McClellan, Meade, Thomas, Lee, the two Johnstons and Longstreet.

Sir Charles Napier said he was prepared to teach a great deal of tactics to a regiment in any part of Great Britain, because he could, with a small body of even ten men marching along a road, teach the preliminary and fundamental principles of military art.

We have been inoculated with the idea that in the event of war regular officers would at once attain high rank and command;

* "The feature of future wars will be their suddenness, the promptness of operations, the briefness of time in which decisive events will come about; we must be ready *before* the first hour."—GONDRÉ.

therefore they must devote much time to the study of strategy and grand tactics, confining practical instruction to the company and battalion drills prescribed in the drill regulations, making them sufficiently frequent to insure a fair amount of discipline and a good appearance before the inspector.

The proper objects of parade-ground drill are instruction in discipline and preparation of the units for tactical work in the field. We have regarded garrison drill as the climax of training: it is the beginning; the means, not the end.

In close-order drill we master the alphabet of war; in minor tactics we reach words; in manœuvres we combine the words into sentences which express thought, lacking the fire and passion of that inspired by actual war.

The great pianist practices the five-finger exercises for hours daily, to give his hands strength, agility and accuracy. They are wearisome but necessary preludes to great symphonies, which charm and delight thousands. The peace training of an army should prepare it for war, otherwise its *raison d'etre* is not well established.

An army in war is generally found in one of three situations: in combat, on the march, or in camp at rest; the practical training of officers and men should therefore be constantly directed to perfecting them in every detail connected with those situations. It is of course impossible to imitate even faintly the casualties, hardships and accidents of actual war. We can practice faithfully the tactics of field and camp which we expect to use when war comes, and can strive to develop the qualities of mind and heart that nullify suffering and distress.

War would be quite simple if the earth were a vast open plain, with free vision and easy communication in every direction; theory would have its maximum value; for, war would be conducted on geometrical lines as laid down in some text-books. The complications of modern warfare are largely due to the diversified and ever changing forms of nature, and the works of man, which become either conveniencies or obstacles, according to their value to friend or foe.

The artist views the land for its picturesqueness; the geologist, for its strata, minerals and fossils; the soldier is concerned with its tactical importance; how he would attack or defend localities; how he would post his out-posts; where he would camp or bivouac; in fact, he could devise an endless variety of problems.

In war, his success would depend on the correctness of the solution and the energy by which it was effected.

Some distinguished soldier, whose name I cannot now recall, said "I attribute the greater part of my success in war to the habit I acquired when young of continually studying the ground as I marched with my men. I would fancy my command attacked at various places and would, in my mind, dispose of the troops to meet the emergency. Thus I was constantly practicing with the tools and material I was to use later."

Battles are rare occurrences; marches and camps with their attendant advanced and rear guards, outposts, patrols and reconnaissances occur daily.

In our next war we shall probably meet an enemy, thoroughly trained in all of its details. To meet him on equal terms, we must begin preparation at once.

The instruction must begin as soon as the lieutenant joins his company.

The captain should be held responsible for this, as laid down in par. 185, I. D. R. and he should be permitted to conduct it as specified in that paragraph; and then be held responsible for methods and results.*

We are many years behind in our methods. We talk glibly and knowingly about "the increased individuality and responsibility of company commanders under the new battle conditions," but we have taken care to suppress all cultivation of those qualities in time of peace. Individuality with good judgment, and a willingness to assume responsibility when thrown on his own resources are admirable qualities to cultivate.†

The young officer should at once be started on the road to a knowledge of company administration. The captain should teach him to inspect the barracks, the mess, the clothing and equipments of the men. He should serve an apprenticeship in the company office until he can correctly and readily make up all the records, returns, rolls, requisitions and correspondence. At a suitable time he should be given charge of the messing that he

* "The instruction of the lieutenant of the company is considered one of the first duties of the captain. It is further developed under the battalion commander; so that each, from the general to the corporal, is in turn instructor and pupil."—KAULBARS on the German Army.

†Without fearing responsibility, every officer in all circumstances however extraordinary, is to stake his whole personality for the fulfilment of his mission, even without waiting for orders.—Felddienstordnung, 1887.

may learn methods of cooking and caring for rations. If he is of the right material, and has proper interest in his work, he will soon become proficient in these details. He must be instructed in the proper methods of disciplining men; how to combine firmness with justice, to exercise authority so it shall exist for the benefit of the governed and not as a perquisite of the governor. His own discipline must not be neglected. I am not an advocate of the harsh, rigid system of Germany. It is not attainable in our military system, nor is it suited to the character of our people; but our system is too lax; it needs strengthening.

Instruction in guard duty and the practice of military courts will naturally come in the course of his duties.

Almost every officer gets some experience in post staff duty. We do not expect to make expert staff and line officers of all, but a knowledge of the duties of an adjutant, quartermaster, commissary, may prove valuable to an officer, who must (in our service) often be a general utility man. But few second lieutenants join a regiment each year. It will therefore be an easy matter to attach them in turn to the offices mentioned above, during the winter season, to learn the systems of work, supply and accounts. Many men despise details and affect a superior knowledge of what they call the great principles of their profession. Frederick and Napoleon found nothing so small as to be beneath their notice.

We have arrived at the point from which the training of the officer and the enlisted man must proceed together. The captain* and the lieutenants will be the instructors, and at the same time pupils aiming at greater self-perfection.

The second lieutenant should be given charge of the squad drill, and be kept at it until the captain is satisfied with his method and knowledge. In superintending and directing the training of the individual soldier, his intelligence, earnestness, and ability to instruct will soon be made manifest. He will not be fit to command a company until he has mastered the processes of training and developing its individual members. The efficiency of the group is but the average of the capabilities of the individuals who compose it. He cannot too early learn to be patient,

* "The instruction of the lieutenants of his company is considered one of the first duties of the captain. He alone can guide them to the proper road, make them understand and love their duties, prepare them, in a word, to become later in their turn, good company commanders."—Official German.

zealous, and just, and thus gain the respect and confidence of his men, which is the foundation of all good instruction. When the captain is satisfied with his progress, he may advance him to command of the company during a portion of the drill hour.

After all drills, the captain should kindly and quietly correct any faults and errors he may have discovered. In the tactical work he should encourage intelligence and spirit rather than a pedantic adherence to set forms.

Progress and variation are necessary to sustain interest in any occupation.

An examination of the Army Register shows that the senior captains of the line have been doing company duty for thirty-four years, including four years of war service. They are more than human or have retained more than their share of youthfulness, if they can still put any enthusiasm into parade ground drills for the company and the little duties which should long ago have been relegated to their juniors in age and rank.

It is well-nigh impossible to prescribe a system of instruction for officers which can successfully contend against these disheartening conditions. The political economy that keeps expensively educated and trained men in subordinate positions during the best part of their lives, is very weak and near-sighted.

We cannot vivify the dead past. Our duty lies in the present; in a new system of instruction which shall be based upon quality rather than upon quantity; which shall have unlimited variation; which shall make progress possible and sustain interest; which shall cultivate the *morale*, said by Napoleon "to be three-fourths in war."

Let us take a day's work for a company under a modern system, so far as it relates to the instruction of the officers. The captain has familiarized himself with the ground in the vicinity of the post. He is going to give the company instruction in outpost duty. It is assembled in light, or heavy, marching order shortly after breakfast. It is conducted without delay to a chosen locality. The junior lieutenant may be kept with the main body for instruction in methods of marching troops, or he may be directed to make the itinerary of the route, or he may be ordered to report to the senior lieutenant for instruction in advanced guard duty as the captain may elect in pursuing his system.

Having arrived at the place chosen for the exercise, the cap-

tain announces that the company is to furnish a support and two pickets in a system of out-posts for the main body encamped at a point in rear. The first platoon is to form the support and the sections of the second platoon are to be the pickets. The captain locates the support, assigns a picket to each of the lieutenants, directs them to post them and to throw out two double sentinel posts from each. As soon as the work is completed, the captain accompanied by the lieutenants, inspects the positions, requests each officer to give his reasons for selecting the posts of his picket and sentinels, what preparations he would make for defense, what instructions have been given to the sentinels, what patrols he would send out; and directs each to prepare a report and sketch for the commander of the out-posts. He makes such criticisms as he deems necessary, out of hearing of the men. He examines the sentinels, asks their orders, the ranges of certain points, how they are going to see as much as possible without being seen, questions them on orientation and the numerous detailed duties of their positions. On another day the lesson may be varied by detailing a few men to represent an attacking party of the enemy, or new ground may be selected. The lessons may be repeated as many times as there are variations of terrain within reach. Each lesson will occupy a morning. Other lessons may include the use of the company as the advanced guard of a battalion with all of the details of points, flankers, patrols, attack and defense, crossing of streams, reconnaissance of woods and villages, or, as a rear-guard delaying the enemy until the main body has reached a place of safety.

The construction of rifle pits, the occupation and intrenchment of defensive localities and the construction of obstacles can be practically carried on at many posts surrounded by large reservations.

The cavalry must be ready when war is declared; its peace training must therefore be constant and extensive. As it is the "eyes and ears," patrol and reconnaissance work, screening the army, keeping touch with the enemy, guarding convoys, transmitting orders, destroying railroads and bridges, and swimming streams, are legitimate parts of its peace instruction. We cannot, of course, destroy railroads and bridges in time of peace, but we can examine them and decide upon a plan of action should similar conditions be imposed in actual war.

There is no difficulty in deciding what to do; the trouble lies

in determining how it shall be done, and doing it. Mentally we are lazy. It is much easier to hold to routine, "that microbe of human thought," * than to shake off mental lethargy and originate and act upon new ideas,

Routine destroys originality; it begets apathy and is outraged by innovation. It is inimical to the qualities we are most anxious to preserve. A great deal of routine work must be done in every profession and ours is no exception, but we have a wide range of subjects with which we can for seven or eight months of the year vary the dull routine and monotony of garrison life, stimulate mental activity and give healthful employment for the faculties which will save them from atrophy.

In addition to the opportunities mentioned above, we have extended order drills which should always be held on varied ground. New conditions can be had by marching to new localities.

Companies may be combined for joint operations, one to act offensively; the other, defensively. No two consecutive drills need be alike; a constant variation can be maintained.

Three mornings per week should be given to minor field exercises and two to close order movements. The last two months of the drill season should be devoted to the battalion in a course similar to that outlined for the company. The major will not only perfect the training of his own unit, but will also judge the efficiency of the instruction given by his company commanders, knowing that he in turn must answer to the colonel. Each grade should be entrusted with the responsibilities which belong to it, and be held responsible for the way in which they are discharged. Increased rank would then signify greater experience and greater ability.

Par. 252, Infantry Drill Regulations reads:

"The major is responsible for the instruction of his battalion. The officers are assembled for theoretical and practical instruction."

For fear this might be misunderstood, it continues:

"The instruction of officers embraces the Drill Regulations and such other instruction as pertains to their duties in peace and war."

The intention is clear and unmistakable. Has the enacting clause been struck out, or are we to adopt some day a rational common sense system of instruction and responsibility?

* General Iung.

If an officer is not morally, mentally and physically fitted to energetically perform all of the duties of his grade, he should be replaced by one who is.* Twenty-three hundred officers selected from seventy millions of people should as a corps be without peers.

"The regiment manœuvres but does not fight," is a German maxim. Regimental drills are principally for the benefit of the field officers.

Each regiment should be a school for its officers and men. A generous emulation could be aroused by bringing two or more regiments together for tactical movements at the close of the drill season. The rivalry would stimulate regimental pride and encourage industry.

Enough troops to represent two small brigades should be assembled each autumn at some point on the frontier (preferably Fort Riley, because the cavalry and light artillery are already there) for field manœuvres. Each company should have its full quota of officers and be placed on a war footing. Any other officers whose services could be spared and who would be willing to take leaves of absence for this purpose, should if they desire be attached to the commands. They should be required to make reports and criticisms in writing at the close of the manœuvres.

Each evening, the movements of the day should be discussed at a meeting presided over by the commanding officer. The remarks of the juniors should be called for first, to encourage independence in thought and careful judgment before expression of opinions.

We must remember that military science is not an exact science and that the same results may be obtained by different methods. The most capable officers in the service should be detailed to act as umpires at these manœuvres. Their decisions and reports should be printed and be circulated throughout the army.

Regiments should not be permitted to participate in these

* It is the special duty of the general commanding to see that all of the commanders of divisions, brigades, regiments and battalions and all the field officers in the district of his army corps retain their posts only so long as they have the bodily activity necessary for service in the field, and the knowledge and capacity needed for their several particular callings. The moment he notices in this respect the slightest change to the detriment of my service, it is his duty, for which he will be held responsible, to inform me."—King's order in Cabinet, March 13, 1816.

manœuvres until the tactical instruction of their companies and battalions has prepared them for higher instruction.

"It is to be well understood that the object of these manœuvres is not to illustrate war, but to develop the instruction of the troops as well as that of the officer."—Official French.

All instruction must be progressive. Starting with simple tactical exercises, we must reach the complex ones gradually, giving to each element the time and labor its importance deserves.

Theoretical instruction is analytical; practical instruction should be synthetical. We must begin at the bottom, and build up a simple, solid structure which shall survive the vicissitudes of a long and varied career. Such a structure must be founded on discipline and character and be cemented with loyalty and zeal.

Knowledge acquired from text-books does not tarry with us long unless it has been fastened by some practical illustration. The eye is the most potent feeder of the intellect; we rarely forget the main features of a landscape we have once carefully observed. The impressions made on the mind by careful and interested observation of tactical movements done on the ground, would be still more indelible. Theoretical instruction is apt to be dogmatic, and to attach great importance to set rules and normal formations. Normal formations are necessary. They are condensations of what we consider the best types and are safe guides for those who lack self-confidence, experience, and skill in handling troops. They must not be permitted to destroy initiative and individuality. They should be recommended rather than prescribed.

We are making a start in the right direction. We have not acquired much momentum yet, perhaps it is well to go slowly at first. Each department commander should order three drills per week in minor tactics and two in close order movements, for every infantry and cavalry post in his command during the available season. The methods and system of work may be left to the judgment of the post commanders, who must adapt them to the capabilities of their commands, regulate the progress and control the spirit of the instruction.

The object of the autumn inspection by the department commander, or his inspector general, should be to examine, on the field, the results of the season's work.*

* "What the inspector inspects, that will the instructor practice his men in. The longer the period of peace, the more this usage will take root."—HOHENLOHE.

The average number of companies in a department is forty—ten battalions. Four days ought to be devoted to the inspection of each battalion. The inspector should give particular attention to the discipline, interest and zeal of the officers.

We have a right to assume that the principal object of an inspection is to determine the readiness of the command for actual service, which must include not only the service of the present, but future contingencies as well. Four days of minor field-exercises, held near the close of the drill season, would fairly demonstrate the efficiency of a battalion, to an expert inspector.

The inspections of the administration and interior management of the commands can properly be made during the winter months. If the inspector is an officer with high professional attainments, as he should be, his criticism and suggestions will be of great benefit in future work.

This system of responsibility, work and inspection appears complex at first glance. It should not be so in practice.

The tendency of peace service is to increase the number and magnify the importance of details. War obliterates all but the simple principles; we must therefore strive at first to make the instruction as simple as possible, and should keep it so until the officers and men are thoroughly drilled in the principles upon which the details are laid. Even Clausewitz, who wrote so extensively and learnedly on war, admitted that "war is simple, but the simple is often difficult of execution."

Let us take patrol duty for example. The principles are,—get all the information you can, and see as much as possible without being seen; do not get cut off from the main body; if surprised one must escape to carry back the information; always keep in mind the object of your mission.

If these principles are successfully carried out in war, it will make little difference how success has been attained.

The officer or non-commissioned officer in charge of the patrol, will not devote any time to an effort to recall what the book states; it will all be given to directing his men and watching for signs of the enemy. His sole guides will be judgment and experience: the first is closely related to the latter. The greatest teacher is war; as we must be ready "before the hour," the only safe course is to simulate war as nearly as possible, giving unremitting attention to the cultivation of the moral qualities,—cour-

age, discipline, loyalty, and that indescribable *élan*, now more potent than ever.

TACTICAL INSTRUCTION.

During the long winter months systematic out-door work will be impossible. We must turn our energies into some useful channel. What shall it be?

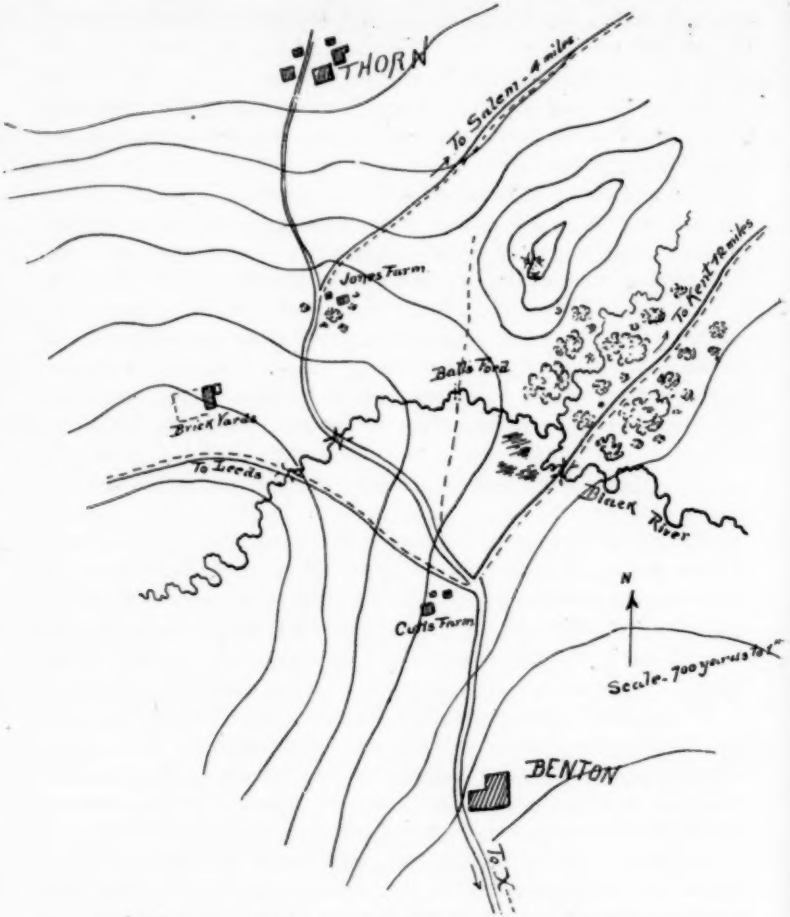
"Throughout the Prussian army they require of each officer, during the winter, a memoir written on a given subject. The subjects are designated by the battalion commanders, who in their choice must arrange them so their officers will be obliged to work and reflect. With this in view, they put the questions so they cannot be answered in a few words, but the officer must on the contrary be required to make long and careful research through the books at his disposition. Thus they are not content with requiring of an officer an account of some battle or campaign, but compel him to produce a criticism of it, or to discuss judiciously the influence of particular circumstances on the course of events."

"The French by a ministerial decree put before their officers a long series of questions requiring hard work, numerous researches, and serious reflection. They were eminently fitted to form the judgment of the young men, but were insufficient to develop their tactical instruction."—*Journal des Sciences Militaires.*

We find sufficient points of similarity between the German system and the Lyceum to lead us to believe that the latter is an undeveloped child of the former. None of these systems is fully adapted to our wants at present. We need a tactical school which shall develop our thinking qualities instead of filling our heads with a lot of unarranged, undigested information. The machinery of the Lyceum is now in operation. To get a new product we need only change the dies. The only apparatus required, will be a few black-boards and some wide cartridge paper. The commanding officer may prescribe the problem, or he may designate some officer to provide it. We must start with simple ones. Von Moltke prepared many for staff officers, and we have his solutions for reference.

The following example will clearly illustrate the system I propose:

A map (see map) of a bit of country is put on the board or on large paper, before the time set for the meeting. After the



meeting has been called to order, the presiding officer announces the problem for the evening as follows:

THEME.

The advanced guard of an army corps comprising, 1 regiment of cavalry (12 troops); 1 brigade of infantry (3 regiments); 1 battery of artillery (6 guns) and 3 ambulances, is marching along the main roads towards Thorn (map).

Arriving at Bern, where it should pass the night, the commander receives the following order:—

X—June 5, 1896, 11 A. M.

The enemy's scouts have been seen near Thorn. It is urgent that you advance to the line of the Black River at once. You will proceed with all possible despatch to Benton, where you will halt and dispose your command so as to hold the crossings of the river.

Official S—.

B— Major General, Comd'g.

Asst. Adjt. Genl.

The theme having been placed on the board near the map, the work for the evening would be as follows:—

1. To draw up the orders to be given by the commander of the advanced guard.
   - *a.* To the cavalry in reference to the service of exploration.
   - *b.* For the service of security for the night.
   - *c.* For the bivouac of the main body of the advanced guard, and its disposition for combat in case of attack.
2. The reports of the following officers:
   - *a.* Of the cavalry officer charged with the exploration.
   - *b.* Of the commander of the out-posts.

Thus five logical and simple sub-divisions of the work can be made and one can be assigned to each of five officers.

At the beginning of the course the topics may be assigned before the meeting, to give the officers opportunities for familiarizing themselves with this kind of work; but after a few months' experience, the conditions as to time and information should be made to conform to those of war as nearly as possible.

After all of the work, such as the orders, reports and maps has been put on the boards, the problem should be open for discussion. Beginning with "a." the events should be taken up in the probable order of their occurrence. Each officer should have an opportunity to explain his work when it is reached, and a final reply to the criticisms passed upon it.

The commanding officer should preside and direct the order of work.

In problems similar to the one given above, each order should be taken in turn and examined to see if it is plain, if it contains proper and sufficient information. It may also be discussed from a tactical point of view, but we should be careful to impress

upon the minds of young officers that orders from superior authority are for execution and not for discussion.

Having finished the orders we pass to the reports which should explain in detail:—the movements of the cavalry in exploration; the location of the outposts in detail, accompanied by a sketch; and lastly, an investigation of the proposed method of defending the crossings of the river.

There is certainly ample material in this little problem for one, possibly two, evenings' work. The discussions would not end with the close of the meetings. They would furnish a great amount of material for daily thought. They would fasten tactical principles in our minds, develop independence and originality of thought and increase our power to think quickly and correctly. All officers would be interested in the school. Young officers would get the benefit of the knowledge and experience of their superiors, as they cannot get it now.

Essays are usually prosy compilations, quite as uninteresting to the reader as to the listener. They cannot be compared in educational value to the tactical school outlined above.

The problems are unlimited in number and variation. Original ones may be alternated with historical ones, preference being given to combats and battles in which our countrymen have taken part. Our patriotism will be increased by the study of the heroic deeds of our people, and we will become more familiar with the methods of fighting of the men we must lead in action.

By adopting this method of instruction we might be relieved from the insinuation that field officers and "captains over fifty years of age" cannot compete in essay writing with young subalterns. It might also demonstrate that the profession of the soldier is not unique, but is like other professions in this—age and experience are badges of wisdom, moderation and good judgment.

The "war game" on maps, or on clay, or sand models is excellent winter employment and good tactical training. It could be played in conjunction with the course given above.

Good umpires are necessary in this game. We could soon develop them. If small problems could be solved, first in the war game, and afterwards on the ground, the benefit would be greatest.

War games must not be taken too seriously. We must remember that the little markers are inanimate objects without

emotions. They do not get tired, or footsore, or hungry; they take no account of weather or roads; they never disobey or misunderstand orders; they advance or retreat at will; they suppose perfect discipline and courage; there is a tendency to move troops from one flank to the other, or from one locality to the other according to set rules. They take no account of gallopers or aides. On a map we see the whole country at a glance, and all the positions of our own men. We know exactly what our messengers and detached units are doing at any instant. This is not war.

A study of the game undoubtedly develops the thinking powers and fastens tactical principles in the mind. It is excellent for illustrating theoretical knowledge, as problems in mathematics illustrate the rules. We may learn to select proper locations for batteries, squadrons or battalions; we may simulate the marches of various units and speculate on the number of killed and wounded, but we cannot introduce any accurate estimate of the moral conditions which are more important than position or numbers. If these facts are kept in mind by the players, the games may be made very useful. Any occupation which encourages professional study and reflection will have a good influence on the service.

EXAMINATIONS.

An experienced educator is authority for the statement that "examinations are usually permissions to forget." We are not in a position to dispute the professor's remark. Previous notice of an examination is usually warning to begin the "cramming" process. An officer of average ability can in a few weeks accumulate sufficient knowledge to carry him through his examination for promotion. It does not mean much to an ambitious, studious man, but it is undoubtedly a necessary stimulant to the sluggish energy of the indolent and inefficient. The moral effect is only temporary, because where they are most necessary, they operate by appealing to the low sentiment of fear, and as soon as the fear is removed the subject resumes his normal condition.

To obtain any lasting effects they must be thorough and exhaustive, and the penalties for failure must be rigidly exacted. They should be oral and practical. It is very hard to "cram" for practical work. Written examinations are necessary with large classes. As we have to examine but three or four men at a time the oral method can and should be adopted. More ground

can be covered by this method in one hour than in a whole day by the other method.

As an illustration let us take the examination of a lieutenant for his captaincy. It should be arranged as follows:

Practical	Drill Regulations of his own arm. Minor Tactics, " " " " Road or Position sketching, foot or mounted. Signalling. Equitation (for cavalry).
Oral	Administration and economy of the company. Regulations (disciplinary and legal portions). Minor Tactics. Field Engineering, to include, hasty intrenchments, preparation, of localities for defense, and demolitions. Military and Constitutional Law. Articles of the Geneva Convention. The effect of fire, and fire discipline.
Written	A thesis upon some professional topic assigned by the Examining Board.

To the above mentioned subjects, which are applicable to all arms, we must add the specialties of each arm. A thorough test in a few vital subjects is preferable to a few written questions in each of many topics.

Examinations for promotion should be extended up to the grade of colonel, in every branch of the service.

I have reached the prescribed limits of space in an attempt to cover the subject in a general way. I have tried to emphasize the importance of methods and principles in the belief that if these are correct, the results of instruction will be good and lasting. This belief has been confirmed by every authority I have consulted.

I have endeavored to set forth a rational,* judicious and feasible course of instruction for our officers; rational, because its object is to prepare them for their duties in peace and in war; judicious, because it is just, logical and progressive; and feasible because we have the ways and means within our grasp. No new

* "In all intelligent education the order of teaching is at once natural and rational. The subjects group themselves by their relation to the end in view, and the necessity of each new advance is evident to the student as soon as he is prepared for it." —"Brains of an Army." WILKINSON.

and improbable legislation is demanded; we need but the active assistance of those in authority.

Our theories have grown ripe; what we need most of all is the spirit of action. It is a common thing for men to claim priority of ideas in science and invention, but the man who makes them living, active agents in the world's progress, gets and deserves the rewards.

In military affairs it is frequently impossible for men who have progressive ideas to put them in force. Changes in method can be ordered only from the top, and those high in authority must remember that we are entirely dependent upon them for power to act. The War Department can at any time, if it chooses, put every suggestion I have made into practical operation (except a few bearing on the Military Academy, which was established, and is controlled, by law). The service schools were founded by orders from the War Department, and it retains control of them. Post and company commanders may be rich in ideas, but they dare not act upon them without specific consent from higher authority; long service under this system destroys independence and originality, smothers individual initiative, and keeps us in the embrace of a narrow conservatism which atrophies the most useful mental and moral qualities of the officer. A wise and just system will nourish these qualities and direct them by discipline to a common end.

Our army occupies a peculiar position. It is essentially an educational army, a depositary of military information. It does not even faintly represent the fighting power of our country, which will unfortunately remain latent until the enemy is at our gates. It is too small for effective offense or defense, or to form, as some falsely imagine, the nucleus of a respectable war force.

When the Indian question is settled, as it soon will be by the exterminating and irresistible processes of a higher civilization, and when the States become fully competent to preserve law and order within their boundaries as anticipated by the Constitution, what will be the prescribed work for the army, and how will it make its usefulness so evident as to insure a continuance of the good-will of the people, and a generous support?

One hundred officers are on duty at our schools and colleges instructing young men in military science. Each year the number on duty with the National Guard is increased. The methods of work, the personality, the character and zeal of these officers

are under close observation and the keen scrutiny of influential and intelligent citizens. When they are strong and successful, the army is benefitted; when they are weak and unpopular, we receive an injury which is far-reaching, because censure spreads much faster and further than praise.

If to the number mentioned above we add the number on duty as instructors at the Military Academy and the service schools, we will find that about one-eighth of the line officers of the army are constantly engaged in teaching. As they are returned to their regiments at stated periods the number of experienced instructors is continually increasing. Officers who are competent to instruct brother officers, cadets, and college students, ought to be good instructors for their juniors in garrison. A proper system of instruction would make a school of each garrison with the commanding officer for director and all other officers as assistants, each to have the initiative and responsibility of his grade, and the whole to be bound together by an iron discipline and a common objective, namely, "to fit officers and men to perform justly, skillfully and zealously, all of their duties in peace and in war."

If, as the signs of the times indicate, we are to become an educational army, we must first perfect our own education. Our people rarely see the enlisted man, and are as a rule ignorant of his character, life and duties. They are becoming better acquainted with the officer, and will judge the army from his standard of character and efficiency: we must therefore be prepared to send to them officers "with all the military virtues."

It means hard, conscientious work; unity of purpose, and, above all, a *morale* which knows neither dishonor, disloyalty, nor defeat.

We have the ability and the desire, give us the opportunity.

THE EFFECT OF THE MODERN SMALL-CALIBRE RIFLES AND THEIR BEARING ON THE MILITARY SURGERY OF FUTURE WARS.

By Major ALFRED C. GIRARD, Surgeon, United States Army.

THE scientific study of the laws governing the action of small-arms and their effect on animal tissues is a comparatively recent one, and twenty-five years ago the crudest and most erroneous notions prevailed even among professional investigators.

The first impetus seems to have been given by the Franco-Prussian War of 1870, when the relative effects of the German "needle-gun" and the French "Chassepôt," with the increased range of the latter and the peculiar wounds produced (some even leading to accusation of violation of the Geneva Convention), set the German mind to work to investigate the causes which led to the variation in the wounds inflicted by their large-calibre gun of relatively low velocity compared to those of the smaller calibre French gun with its greater range. The astonishing occurrences at Plevna, during the Russo-Turkish War, demonstrating the inferiority of the Russian weapon, are probably still fresh in the memory of the older members of the profession. The Turkish infantry, at a range of 3000 yards, inflicted serious losses upon the Russian forces, the guns of which were not effective at that range.

The example of the Germans was soon followed by all the European nations, and it was found that with the increase of range and lesser weight of the cartridge of the smaller calibre a greater velocity, consequently flatter trajectory, more rapid rotation and increased power of penetration, resulted. We have to deal, therefore, instead of with an initial velocity of 1315 feet, or 400 metres, of the Springfield rifle, with one of nearly 2100 feet, or 640 metres; a rotation of 2500–3000 per second instead of 710; at 1000 yards a velocity of 270 metres, or 885 instead of 235 feet. (I will not enter upon a comparison of the curves of the trajectory.) The extreme range of the Springfield was 3500 yards, at which the velocity was zero, while the small-calibre bullet, at a range of 7300 yards, still has a velocity of 79 metres, or 95 yards, per second—sufficient to cause a severe injury.

A short description of the calibres of guns introduced by the principal nations may be interesting information.

Austria uses the Mannlicher, and Portugal the Kropatscheck, cal. 315 (8 mm.); France, the Lebel, cal. 315 (8 m.); Denmark and the United States, the Krag-Jorgensen, cal. 30 (7.6 mm.); Germany, their Mannlicher, model 88, cal. 31 (7.9 mm.); Belgium and Turkey, the Mauser, cal. 30 (7.6 mm.); England, the Lee-Metford, cal. 303 (7.7 m.); and Switzerland, the Schmidt (7.5 mm.); Spain, the Mauser, cal. 283 (7.2 mm.); and the Netherlands and Roumania, the Mannlicher, cal. 25 (6.5 mm.).

While the average weight of these guns is 8 pounds, that of the Springfield was 9.30 pounds; the weight of the cartridge is between 22 and 28 grammes (340 to 431 grains), compared to that of the Springfield of over 1200 grains. The average length of the bullet in the modern rifle is 30 mm., somewhat greater than that of the Springfield, but the weight is only 232 grains to that of the late weapon of 500.

It will be seen from this condensed statement that the length of the bullet of the modern weapon is nearly four times its diameter, the weight less than half of that of the 45 calibre, the velocity more than one-third greater, and a range nearly double. As to the material of the projectiles it was found desirable to increase the hardness of the lead with 10 per cent. antimony without great loss of the specific gravity necessary to give the proper energy. This metal, however, would not take the rifling with the enormous velocity and the shorter curves of the modern gun and it was found indispensable to cover it with a thin jacket of harder metal, for which steel, copper, and nickel, or their compositions, were found best adapted. From a surgical point of view this had the very desirable effect of preventing the great deformation sustained by the former projectile on sudden arrest of energy.

After these introductory remarks, concerning the weapons we are dealing with, their history and reason of existence, it is desirable that we consider in the shortest possible manner the theory of their effect.

I have hinted above at injuries produced by the Chassepôt, which led to accusation of the violation of the Geneva Convention. The Chassepôt was not yet a small-calibre rifle, although its bore was much smaller than the older types. At certain ranges it was found that with a relatively small entrance wound

there was connected a large cavity of destroyed tissue. This resembled very much the effect of the so-called Express rifles which were prohibited in the Geneva Convention. In the Express rifle the bullet has a point of hard metal, and its body, composed of soft lead, is hollow. On striking a bone the point loses velocity, while the body, being softer, expands in all directions and causes enormous destruction. This result was under certain conditions achieved by the French service rifle, but it was found that if there was deformation of the projectile it was in no proportion to the terrible wound produced. This led to vast numbers of experiments and investigation to determine the cause of this peculiar injury. Deformation of the bullets, formation of indirect projectiles produced by the impact of the ball, rotation, fusion, have been the principal explanations attempted, but they have all been more or less conclusively disproved. The explanation which is now generally accepted refers this action to a lateral effect, in addition to the wedged-shaped one of the bullet. It is the result of impact at a velocity which is too great to permit the lateral displacements imparted to the circumference of the perforation, and communicates the shock in all directions as far as the continuity of the object extends.

This effect is a twofold one—hydrostatic when liquid or semi-liquid parts, such as brain or liver or a filled heart are struck, or a direct transmission in very compact tissues, such as the brittle parts of bones. It does not depend on deformation of the bullet, consequently the jacket of the new projectile and its preservation of shape are no protection. The principal factors are velocity and diameter of the missile. As the old bullet had a greater diameter and the new one a greater velocity, they seem to compensate each other, and the explosive effect of the two projectiles remains the same as to effect, but, unfortunately, is carried still further by the new one, as we will see later on.

The beautiful experiments of Prof. Kocher, of Berne, have greatly contributed to the elucidation of the subject. His firing was done on glass plates, rosin, metal, stone, clay, and soap plates, also on tin cans with various contents. It is impossible, with the space at my command, to detail these very interesting and conclusive experiments, but it is important that mention be made of the effect of high velocity, as this is the key-note of the practical deduction as to the effect of the small calibre rifle on the surgery of future wars. In his experiments on glass plates

he demonstrated that a comparatively low velocity causes a perforation of about the diameter of the bullet, with radial fractures; the higher the velocity the greater the opening, the more pronounced the comminution of the immediate surroundings, and in place of the radial cracks numberless concentric fractures, intercommunicating with each other, run over the whole plate of glass.

Plates of soap or lead, with low velocity, showed a plain perforation, while with high velocity the hole was many times the diameter of the calibre, without loss of weight, simply by lateral compression. Lumps of clay presented, with low velocity, a simple perforation; with high velocity, a small entrance and exit opening, with a fusiform cavity, in the centre of which the greatest width was nearly the size of a fist. The effect of this lateral pressure on fluids was demonstrated by firing on empty tin cans, or cans filled with dry substances, with the result of an opening the size of the missile, while cans filled with fluids burst in every direction. These are a few of the most striking experiments, showing that the explosive effect of a bullet increases in direct ratio with its velocity, and that, *ceteris paribus* the gun which imparts to its missile the highest velocity will exhibit the most destructive effect.

The modification caused by the diameter has been mentioned above.

As to deformation of the projectiles, while no doubt a flattened bullet has a broader point of impact and will lead to greater destruction, numerous experiments on glass plates, etc., have shown that when copper or steel bullets are used, which are not subject to deformation, the explosive effect was still apparent when the velocity reached a certain point.

The formation of indirect projectiles in the body, as by detached pieces of bone, while no doubt such is frequently the case at any range, when a bullet has sufficient penetration power, does not explain the enormous destruction, which only happens at certain ranges and always under certain circumstances, without a necessary increase of the impact by detached pieces of bone.

The centrifugal action assumed to be produced by the rotation of the bullet has long been believed the cause of explosive action. Unfortunately for this theory, this effect was observed with round balls propelled from smooth-bore guns whenever the velocity reached a certain degree. Another circumstance tending

to disprove this theory is that although in the modern rifle the bullet makes 2500 revolutions in a second, its velocity is such that in a flight of three feet, approximately, only four revolutions are accomplished, and it would therefore perform but a small part of one on striking the human body.

The fusion of the lead and the scattering in all direction of the molten particles has been given as another explanation. Positive experiments, with careful thermometric measurements, have shown that the bullet, while it is heated in its passage through the barrel of the rifle, never acquires the point of fusion thereby. The theory had its origin from the observation that the bullet, on striking iron plates or stones, becomes heated to the point of fusion. This, however, is due to the sudden arrest of its energy and its transformation into heat under well-known physical laws. Such an arrest does not take place in the human body unless the velocity of the bullet is greatly reduced, when the transformation into heat is not sufficient to cause fusion, not even scorching.

I have given so much time to the so-called explosive effects observed since the introduction of rifled muskets, with their resulting increased power of penetration, due to the velocity of the projectile, because they are the ones which produce the terrible injuries which have in the wars subsequent to this change of armament littered the battle-fields with the dead, necessitating mutilating operations in the hospitals, and filled the pension lists with the names of thousands who lost their limbs. Was it not natural, when the civilized nations found it desirable to reduce diameter and weight of their rifle bullets, that a shout of relief arose from those who saw therein a reduction in the horrors of war—a simple small perforation which would heal almost like a subcutaneous wound, and when this belief was supported by apparently correct experiments the hope became a certainty? Unfortunately, this hope appears to have proven utopian. The experiments which appeared to support it lacked two essentials: first, the enormous velocity; second, the objects on which the experiments were made did not resemble the tissues which were supposed to have so fortunately escaped the cruel effects of the former large projectiles.

The difficulty of striking with any degree of certainty the parts of animal tissue on which experiments were made to ascertain the injuries produced by the modern rifles, the great incon-

venience of finding room enough to fire at actual distances, and the great cost of such experiments led most observers to fire with reduced charge and at correspondingly reduced distance in order to obtain the final velocity which the projectile would have obtained if full charge had been used on actual distances. It was believed that in that manner a similar effect would be obtained. The laws of ballistics, under which this assumption was made, date, however, from a time when the projectiles had one, two, or at most two and a half times the length of the calibre, and it appears doubtful if they can correctly be applied to the modern rifle, with its bullet of four or more lengths and its enormous velocity. The other cause of error was due to the fact that the experiments were made on dry bones, the walls of which readily receded from the wedge-shaped impact, and consequently facilitated the so-called humane results, while the hydrostatic effect essential to explosive action was lacking, owing to the absence of the liquids, which in the fresh bone fill every interspace, and thus make a lateral escape of molecules impossible within the time called for by the passage of the projectile.

The only observers who have made these experiments at actual distances, at least in a sufficiently large number to give them some show of conclusive force, are Demosthene, of Bucharest, and the German Commission under the auspices of the German Emperor and the direction of Surgeon-General von Coler. These two have come to the same results, and a more detailed account of the latter series of experiments will suffice to enlighten us as far as artificial conditions can do it. The actual distances were from 25 to 2000 metres; the number of hits over 1000. The anatomical objects were fastened to a wooden frame and enveloped in sheeting to obtain information on the penetration of vestments. The closest approximation to living tissue was attempted by injection of fluid into the tissues and of animal blood into the blood-vessels. The preparations were then frozen and the wound channels filled with "Wood's" metal, thus fixing the contents of the wounds in their position.

The following were the results:

As to deformation of the bullets, it was observed in 4.5 per cent. of the hits, taking all of them into consideration; if the hits on bones alone were considered, the percentage would be much higher. The forms of deformation were simply flattening of the point on the side or basis, with or without tearing of the jacket,

up to entire loss of the jacket, with absolute destruction and disruption of the projectile. The greatest degree of deformation was found up to 1200 m., and it did not disappear up to 1600 m.; from which distance they exhibited only more or less flattening. No deformation was caused by passage through soft tissues; the greatest degree resulted from impact on the long bones. No conclusion can be drawn as to the distance of a shot from the deformation of a missile, as the degree of resistance varies in nearly every case. Whenever deformation took place the injury to bones and soft parts was in every way similar to those produced by the enormously deforming lead bullets of former large calibres.

As to the penetration of the projectiles and their arrest in the body, it was observed that only four times undeformed ones were arrested, and at a distance of 1600 to 2000 metres, and twelve times deformed one. In forty-six cases of deformation parts of the jacket and pieces of lead remained in the body. In 12 per cent. of the cases part of the sheeting covering the wound was carried in. As to lateral impact, it occurred frequently in consequence of unequal resistance of the tissues, and when several bodies were struck by the same bullet it rarely retained the direct flight, and the injuries caused were then dependent on the width of impact and remaining energy. If this latter was considerable then a combination of rotation and pendulum motion caused destruction similar to explosive action.

As to the wounds produced, the results were as follows:

Wounds of entrance of the skin greater at short ranges, mostly smooth, largest in lateral impact. Wounds of exit greater than the corresponding wound of entrance, and more regular. At close ranges they were found very large, when a bone adjacent to the skin had been comminuted. In muscles smooth, straight wound channels, at close ranges as large as the calibre, at great ranges smaller. Greater destruction was produced only when the projectile met resistance, was turned, or struck with lateral impact. The smaller blood-vessels were torn, the larger ones rarely struck; when this happened the injury to the intima was greatest. Complete division of the larger vessels only at close range. In the heart simple perforation in systole, extensive destruction in diastole. The lungs exhibited a narrow-wound channel, the walls of which were infiltrated with blood. The liver was always greatly injured, extensive pulsification at close ranges. Explosive action evident yet at a range of 2000 m. (with a velocity of 170 m.) The spleen

suffered in the same manner. Stomach, intestinal tube, bladder, had on an average three perforations, maximum eight; size between 3 and 110 mm.; shape of wounds generally round. (The cases observed among the living have always proved fatal.) In gunshot wounds of the skull explosive action at close ranges, generally decreasing with longer range. At a distance of 1000–2000 m. (velocity of 200–170 m.) simple perforation, and finally at a distance of 2700 m. arrest of the projectile in the cranial cavity. The brain was extensively destroyed in shots at close range; at longer ranges the wound channel was narrow.

Effect on bones: At a distance of 100 m. (566 m. velocity) the diaphyses were comminuted into small fragraments, the epiphyses likewise, sometimes connected by the periosteum. The same results at a distance of 200 m. (500 m. velocity) with less destruction of the soft parts; at 400 m. similar result, with less comminution of bone. At 600 m. range simple perforations were found occasionally with radial fissures of the epiphyses. The destruction of the shaft remains, however, as severe as at shorter ranges, but with a lesser cavity behind the bone. At 800 m. simple perforations became more frequent in flat bones and the epiphyses. At 1000 m. the destruction of the shaft of the long bones remained still the same; in the femur splinters 11 to 15, in the humerus 6 to 18 cm. long, but they were less numerous and were connected by the periosteum. The spongy bones exhibited simple perforation. At 1200 m. the splintering continued. The same at 1600 m., with less displacement of the splinters. The same injury in the shaft of the bones continued at a range of 2000 m.

We may state as a *résumé*, that the comminution of the shaft of the long bones was about the same at all ranges, the splinters at close range being smaller, more numerous and less connected by periosteum, while at long ranges they were less numerous, larger and connected. Up to 700 m. the cavity caused by the comminuted bone reached the skin wound of exit; after that becoming smaller, and ceased at 1600 m. The spongy bones and ends of the long bones were comminuted up to 600 m., after which simple perforations began, and after 1000 m. became the rule.

This is probably what we will have to deal with in future wars —simple perforations in wounds of the soft parts—severe bone injuries, as a rule, involving the whole bone, except where the

epiphyses are struck and then only at a range of 600 metres and over.

Thus far the experiments of the German Commission. As to their correctness: It is admitted that there may be a difference in the reaction of living tissues and that some of the conclusions arrived at by these observers may not prove absolutely correct. The objections made by some sensational writers that an entirely different state of affairs will be found when living bodies are struck instead of "half-rotten dead tissues" do not hold good. The parts experimented on were well-preserved specimens, and as mentioned above, prepared so as to resemble as far as possible living tissues.

Next to the degree of injury inflicted we will now have to consider the relative frequency of wounds and find that with the modern rifle troops are brought much sooner under fire and with a weapon where the curves of the bullet do not call for an absolutely correct estimation of distances, which is so necessary with a shorter-range weapon, consequently have to meet greater accuracy of fire. Owing to their lighter weight, a larger number of cartridges can be carried by each man, and methods of replacing the ammunition expended by rapid firing will be so perfected that troops within firing distance will have to meet a perfect hail of bullets, and if of equal ability to stand killing, their end is likely to be that of the "Kilkenny cats."

Joking aside, if we consider that with the modern repeating rifle 40 shots can be delivered in a minute with fair accuracy and up to a range of 6000 yards with a remaining velocity sufficient to perforate an abdominal cavity, we may well consider the estimate of the German Commission and other authorities of a loss of 20 per cent. of the troops engaged a moderate one—only an increase of 5 per cent. over the experiences of other wars.

From the numbers of experiments as to the percentage of hits made on silhouettes I select two to illustrate particularly the enormous rate of casualty. If we only admit one-tenth of these hits for actual warfare we still have a percentage far exceeding that of the older weapon. For those who are not acquainted with the modern styles of targets I will explain that a silhouette is the front presented by either lying-down, kneeling or standing footmen, or in cavalry the front in advancing or side view. The outlines are represented by an iron frame, with canvas stretched between.

The first is the firing of a war company of 220 men at Châ-

lons; the target was composed of 204 silhouettes, mostly in a kneeling position. The firing was commenced by sections at 1350 metres, estimated by the captain, with 21 hits at one volley. The company advanced to 800 metres, firing volleys by sections, with 62 hits. Firing at will to 400 metres, with an average of 4 shots, 96 silhouettes were struck. After that rapid fire, with 203 silhouettes struck, the captain of the silhouette company, who was standing, received 47 shots. Total shots fired, 6500, hits 1887. The magazine was not used.

The second experiment selected was carried out at Hythe.

Thirty-eight men in two squads were concealed on a hill, at an estimated range of 2300 yards from the sea. Each squad fired five volleys at a supposed landing party. The bullet struck about 20 yards from the shore and covered a space of 50 square yards on the water. The rapid volleys were then fired at an estimated range of 1850 yards, the target being 220 silhouettes, representing two companies in attack formation, with 6 guns and 18 gunners; 58 hits were made. Ten volleys were then fired at 134 silhouettes, range 1400 yards; result, 113 hits.

These two examples must suffice to convince you of the accuracy of the new rifle at enormous distances, with a corresponding large number of casualties.

As to the character of the wounds, I quote Sir William McCormack in an address on "Some Points of Interest in Connection with the Surgery of War." Speaking of the recent Wazaristan expedition, that of Chitral, and the storming of the Malakand Pass, when the new rifle was used by the English, he says the volleys wrought great havoc in the enemy's ranks. The factors which determined the amount of damage inflicted by a gunshot wound were the unalterable form of the projectile as well of course as its size, the velocity on impact, and the resistance of the tissues struck. Hitherto about nine-tenths of the wounded on a modern battle-field were disabled by rifle bullets, and the proportion would not diminish with the use of magazine rifles firing some 60 shots a minute and carrying immense distances. During the last twenty years there had been a gradual diminution of the calibre of the rifle and in the weight of the projectile, while its hardness had been greatly increased. The explanation of the extraordinary development of explosive effect seemed to depend on the rapid arrest of the flight of the bullets on piercing fluid matter, and its motion being transferred to the parts im-

mediately surrounding it, and these again transmitting it to parts further removed, just as wave circles were produced by a stone dropped into the smooth water of a pond. The 900 experiments made by the German War Office did not justify Bruns's classification of gunshot injuries into groups or zones according to range. As the range increased there was a gradual diminution in the velocity and energy of the projectile, and a corresponding diminution was observed in the extent of injury.

I have quoted here Sir W. McCormack, one of the highest authorities on military surgery, *verbatim*, as he unexpectedly corroborates the views expressed by me in the various papers published on the subject before we had the indubitable proof of the latest experiments. Volkmann, in a paper communicated to the first Congress of German Surgeons, pointed out the subcutaneous character of gunshot injuries of bones and joints of the modern rifle, which made them less dangerous than the compound fractures, with more extensive injury to the soft structures sustained from other causes. The same observation was made by Pirogoff, who was astonished at the easy manner the wounds produced by the small Circassian bullet healed during the Russian war in the Caucasus. This, of course, refers only to the diameter of the bullet, irrespective of velocity. During the recent war in Chile Dr. Still found that flesh-wounds imparted by the modern rifle bullet, if not infected by probes, readily healed under a scab, that the favorable character of lung-wounds was especially noticeable, and that the bones were less comminuted, and united in about half the time formerly required. Dr. Rivero, of Valparaiso, had made similar observations.

Surgeon Borden, of the English army, reports from the Chitral campaign, as far as he had seen himself or heard from others, that the wounds through the soft tissues at both short and long ranges were clean and incised, with very little or no bruising, and that they quickly healed. Through the bones clean punched-out holes were made with little splintering, and he said in no case was there explosive action. (He probably did not see the latter class of cases, as they were mostly of fatal character, or else the firing was done beyond 600 yards.) He also states that the number of wounded in proportion to the number engaged and actually under fire was larger. He thought we were justified in believing that the next great war would be more destructive to human life, and that the number of injuries, and in

many cases the severity of the injury, would be largely increased, but very many cases would remain less severe in character, more capable of successful treatment, and less likely to entail future disablement, while improved sanitation and antiseptic methods would enormously increase the proportion of recoveries.

We have now arrived at the point where we may consider the sphere of the military surgeon under the new conditions laid down by the change in the rifle. In order to proceed chronologically, we will first look into the question of the care and the removal of the wounded on a typical battle-field, one of the great problems of military surgery. Our time will not permit the consideration of the ever-varying conditions of advantages offered by protection of ground.

If the lesson conveyed by the Chinese war (in which, as reported by the French military attaché, four per cent. of the total killed and wounded of all grades were doctors) is not to be lost, we will have to make a radical change in the disposition of medical officers. (He attributed it exclusively to the longer-range arms of modern times. He further states that the question of protecting ambulances in the event of a European war is one that calls for immediate attention, for under existing conditions the carnage could not but be enormous.)

If the number of injured was only 20 per cent. and 4 per cent. of these were surgeons, there would have to be a supply of eight surgeons to a regiment of 1000 men to furnish the necessary quota of casualties, and there would be none left to attend to the wounded. This enormous proportion is evidently due not only to the presence of medical officers on the firing line, but to the proximity of first-dressing stations. In order, therefore, to have a sufficient number of medical officers to attend to the wounded after a battle they should be kept out of the firing line, and the first-dressing stations should be at least 3000 yards behind it, unless some favorable condition of the ground permitted closer approach. The removal of wounded should not take place until the firing line is removed to a distance of 3000 yards, or the firing has ceased. In their transport to the first-dressing station not only the bearers would be greatly exposed, but the wounded themselves, and it would be better to instruct the men that when hit they would be safer in lying still than in trying to reach the rear. If general instruction was given to the men what to do in case of hemorrhage, the wounded on the line of battle could dur-

ing a lull in the fight be succored by their comrades to prevent at least death by hemorrhage.

If the percentage of severe injuries arrived at by the statistics of Fischer in the Franco-Prussian War is correct, then we may calculate that at least 30 per cent. will have to be carried off the field, and that the remaining 70 per cent. of the men with flesh-wounds will find their way to the dressing station. These 30 per cent. of the 20 per cent. in a division of 10,000 men would be 600 for whom transportation would have to be provided. Assuming that even 2000 yards were considered sufficient distance for the first-dressing station, it would take each litter, allowing 8 minutes for refreshment of the wounded, dressing and loading, 44 minutes for the trip to the dressing station, 15 minutes for unloading and rest of the bearers and delays, and 20 minutes for the return to the firing line, one hour and a half. In five trips, the limit of endurance of the bearers, five wounded would be removed, or 120 stretchers with 480 bearers will have to be provided for to remove the 30 per cent. of the 20 per cent. of wounded needing carriage for a division of 10,000 men, or nearly five per cent. of the entire force, for bearer service alone, not counting the men of the sanitary corps needed for service in the field hospital and the ambulance service. This would necessitate either a very cumbrous hospital corps or a neglect of the wounded, or extensive assistance of the troops of the line.

The first-dressing station should, therefore, during the actual fighting expect to succor only those who by themselves find their way to them and casual cases happening within safe range. No attempt should be made to evacuate the wounded from the battle-field until the close of the fighting, or sufficient advance of the line of battle; then the first-dressing station pushed to the closest possible vicinity, the wounded collected, the dressing applied, and the most necessary operations performed.

The collection of the wounded, in order to still more shorten the time of their exposure, should be performed by the reserves, or any troops not engaged in the fight, if there are any, and for this purpose all enlisted men should receive a limited instruction in first aid and litter service, so as to enable them to apply an occlusive bandage, a splint, and properly lift the wounded. Each man, as provided in the German army, should carry some form of first-aid packet. In order to have it handy at all times it should be reduced to the lowest possible size, and instead of

being carried in a pocket, where it would be liable to soiling and infection, it should be attached to the cartridge belt. To facilitate the rapid clearing of the battle-field each division should have with its ambulance wagons, in addition to the 120 stretchers needed for ordinary transport, an additional supply. The former should be a component of the ambulance train at the field hospital and pushed to the ambulance station at the proper moment. The latter should form part of the train of the division hospital and join the field hospital on proper notice.

Unless a particularly safe location can be found for the field hospital, it should be established out of range of field artillery and the extreme range of the modern rifle, or at least 8000 yards from the firing line, for nothing interferes as much with the comfort of the sick than, in their weakened and relaxed condition, apprehension of further injury. If circumstances permit, a section of the field hospital, with its cooking apparatus, may be advanced nearer the abandoned firing line, and the former hospital as rapidly as possible evacuated into the division hospital. The field hospital, in view of the great front occupied by the open formation of the troops, should be a brigade hospital.

As to the actual surgery called for by the new condition of affairs, we will have a large number of flesh-wounds, which, after reception of their occlusive dressing on the firing line before removal, will only need verification of the dressing, rest, proper position, and in case of further transport, splints to lessen spasmodic action of the muscles. Injuries of the bones at close range will be of a severe character, but owing to their usual small skin opening, may be treated in a conservative manner. Plenty of material for plaster bandages should be on hand at the field hospital to obtain the immobility necessary to make removal to the rear possible without undue pain or irritation by the fragments. It is not to be expected that cases of injuries to the bones will be able to return to the fighting force within the time future campaigns will probably occupy, but eventual recovery, without loss of the limb, and retention of at least partial usefulness, may be looked for.

In order to make this conservative surgery possible, reserve supplies of splinting material and dressings should far exceed any supplies heretofore provided, and the replenishing from depot to division hospital, from this to the brigade hospital, and from this to the first-dressing stations should be entrusted to the most ac-

tive and energetic officers. Injuries to the joints will, if asepsis can be maintained, owing to the little explosive effect caused by their spongy tissues, recover under conservative treatment, and resections will practically be banished from military surgery. With the smaller number of cases calling for mutilating operations, an attempt may be made to perform laparatomies, even in the field hospital in perforating wounds of the abdomen. With the ever-increasing training in the technique of asepsis, the dangers of these operations, even under unfavorable conditions, will be lessened, and a chance of life given when otherwise certain death would be the unavoidable result.

The need of medical assistance on the firing line to arrest hemorrhage is one of the bugbears which modern statistics have laid on the shelf. Out of 87,822 wounds tabulated in Circular No. 6, Surgeon General's Office, of 1865, 44 gunshot wounds of arteries were registered, or 0.05 per cent. Since from the experiments of the German Commission it is shown that injuries of large arteries are rare with the modern rifle, and they of necessity being fatal, especially as the hemorrhage is usually internal and cannot readily be recognized, the hemorrhage calling for treatment will usually be confined to the smaller vessels, which will probably be arrested either spontaneously by the lessened pressure resulting from shock and loss of blood, or by an occlusive bandage.

I regret that as to the possibility of maintaining asepsis I have to remind you of that part of the statistics of the German Commission which show that even with the thin sheeting covering the anatomical preparations shot at, in 12 per cent. this material was carried into the wound. This was confirmed by Dr. Yberra, of the Chilean army, who found that the steel-jacketed bullets of the Mannlicher rifle, in use during the Chilean war, frequently carried fragments of clothing into the wound, and when they were not carefully removed they caused persistent suppuration, which frequently necessitated secondary operation. This was, however, not the absolute rule, and even in the days of the Russo-Turkish War, when asepsis was not so well understood as to-day, it was found that pieces of clothing, in perforating wounds of the knee-joint, failed to cause infection. This chapter of infection by clothing is being now actively experimented on, and I may have the pleasure in a number of months, when conclusive results have been arrived at, to communicate a paper on the subject.

There is also a difference in the shape and size of the particles of clothing carried into the wounds, between the soft-lead, easily deformed bullets of the old-style rifles and the jacketed ones of the present day. In the former the fragments were of considerable size, while the latter line the wound channel, with a fine film of fibres, which, while they may be bearers of infection, will not act in the same degree as irritating foreign bodies. Frankel, in his experiments on animals, found that infection only took place when cultures of streptococcus or staphylococcus were inserted with clothing into the wounds. Pieces of soiled linen, cotton and wool cut from the clothing of soldiers and placed in subcutaneous openings produce no ill results. It is therefore probable that the infection is generally a secondary one, and that the fragments of clothing only serve as culture beds, not having the ability of living tissues of destroying microbes.

The practical deduction from this may be that no search should be made for clothing carried into wounds, lest secondary infection be started, unless such infection has become apparent. Another practical lesson may be derived,—*i. e.*, that there is more danger from dirty fingers and infected probes and forceps than from the contact of the clothing of the wounded, and that an occlusive bandage, generally brought from hospital supplies and handled by persons who daily are in contact with pus microbes, unless known to have been sterilized, is more dangerous than leaving the wounds uncovered. One of the great boons of the modern rifle is the rarity of arrest of the bullet in the tissues. This will do away with one of the most frequent causes of infection—probing.

DESCRIPTION OF AN IMPROVED CAVALRY SKETCHING CASE, DESIGNED BY LIEUT. M. A. BATSON, 9TH U. S. CAVALRY.

By Capt. T. A. BINGHAM, Corps of Engineers, U. S. Army.

THE improved cavalry sketching case, as designed by Lieut. Batson, is an instrument well worthy of attention from military men, or others, who have or may have road maps or reconnaisances to make, with contours.

It is based on the well-known and universally received instrument devised by Col. W. H. Richards of the British army. It has a number of improvements and refinements, however, which are not only ingenious but practical; and Lieut. Batson has had the good judgment to stop just short of complexity and over refinement.

This improved instrument is capable of great accuracy in such work as it may properly be used for; and increasing accuracy will result from practice. None of its parts are any more liable to be bent or broken than is the case with the instrument now in use. It has a convenient case for its protection and comfortable transportation.

DESCRIPTION (*see plate*).

This improved instrument consists of a board E E, Fig. 1, about seven inches square—it may be larger or smaller.

On two sides of the board are fastened wooden side rails F-F and G-G, which are longer than the board, and which hold at their ends the trunnions of the tube-rollers F-G. These rollers carry sketching paper, which may be three to four yards long, and enable it to be pulled along across the board in either direction with any desired degree of tension—a great advantage. These rollers have longitudinal slits for receiving the ends of the paper and thus holding it in place, Fig. 4.

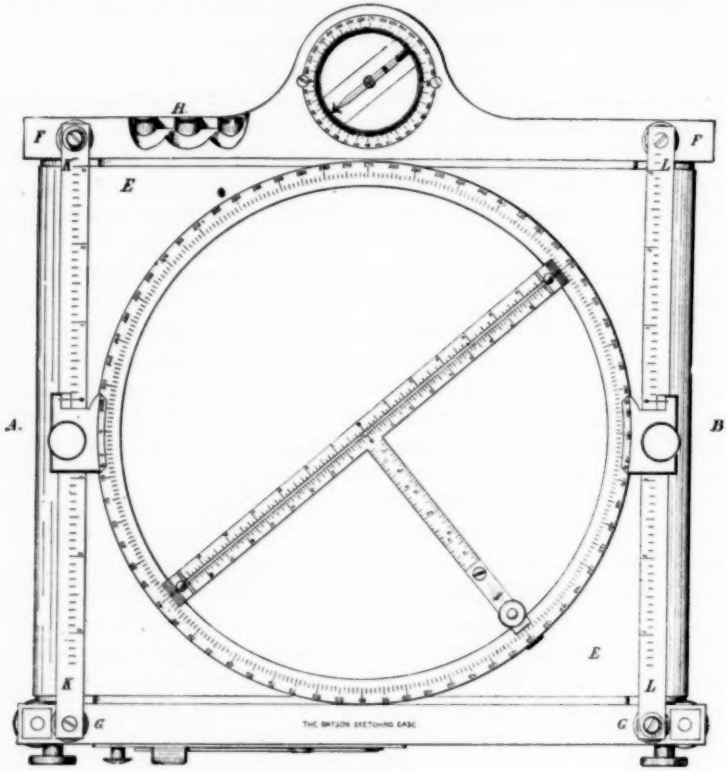
The ends of the side rails are slit like a clothes-pin and clamped by a clamp screw, which regulates the friction of the rollers and gives a fork that will not split, Fig. 2.

One side rail carries a compass having an adjusting and clamping screw-head on the under side, Figs. 1 and 4. The compass circle is graduated to degrees.

At H, Fig. 1, is shown the method of carrying the pencils

most in use, in the body of the board itself; and Fig. 4 shows how other drawing materials are stowed.

Parallel to each roller and above it is a metallic trolley rod or strip, graduated to inches and tenths, each way from the middle, K-K, L-L, Fig. 1. On these trolley rods and controlled by clamp screws slide the two metal cars of the metallic circular pro-



Top View.

FIG. 1.

tractor, which is graduated to degrees. Rods are preferable to flat strips because they obviate too much play in the motion of the protractor along them.

Inside the protractor is a metallic T-square which revolves about the centre of the protractor. The three ends of this T-square are grooved and engage the inner edge of protractor

circle. The long arm of the T-square has two different scales marked on it, one on each side, zero being in the middle. Several scales may be used with this instrument as constructed; they will be explained later. Longitudinally through the middle of this long arm is a slit which enables a pencil mark to be made perfectly straight through the centre of the protractor. This slit is at the bottom of a sort of trough beveled longitudinally along

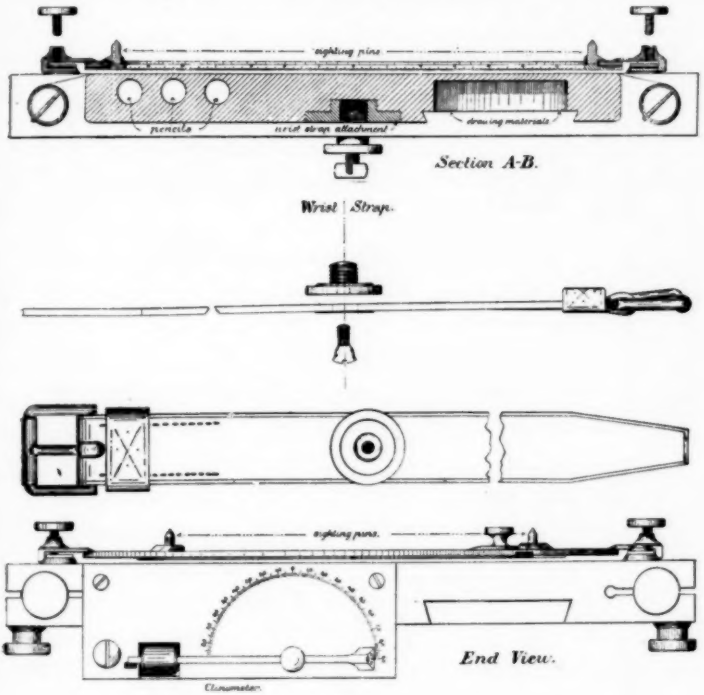


FIG. 2.

this long arm and sloping from the edges down to the middle slit. Hence the cross section of this long arm is approximately V-shaped.

At each end of the long arm projects a short sighting pin.

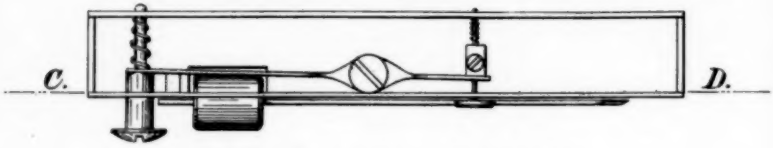
The short arm is graduated like the long arm, zero being the centre of protractor and long arm. It carries a screw at its end to clamp the T-square in any position.

The protractor and compass circles are preferably (but not

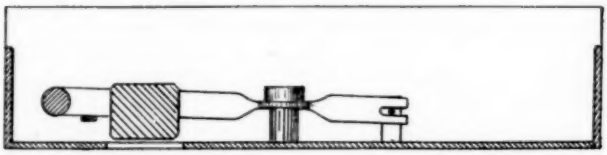
necessarily) placed with their zero diameters parallel, in order that readings of the needle may be easily and quickly transferred to the paper.

Since the motion of protractor and T-square is exactly at right angles to that of paper, their centres can easily be placed at any point on the paper; and since the T-square revolves about the centre of protractor (which always represents observer's station) it is easy to lay down accurate lines of direction by the aid of the sighting pins.

The clinometer is conveniently attached to what is preferably



Interior View of Clinometer from above.



Section C-D

FIG. 3.

the right hand side of the board when in use. It has a pendulum swinging in front of a graduated arc. When not in use, the pendulum weight is caught up out of harm's way; when needed, the pressure of a finger brings it in play. Pressure by a finger keeps the pendulum free while sighting along the board for slope. Removing the finger clamps the pendulum in any position, for reading the slope.

Any scale of horizontal equivalents is purposely omitted in order to allow such scale as may be desired to be written out and pasted conveniently on the board.

Of course the clinometer can be used as a level.

The entire instrument will ordinarily be carried strapped on the left forearm with compass circle to the left, Figs. 1 and 4. The milled head ends of the paper rollers will be to the right and hence perfectly convenient to manipulate.

Attention is called to the fact that these milled heads on the ends of the rollers are merely for turning the rollers and are not

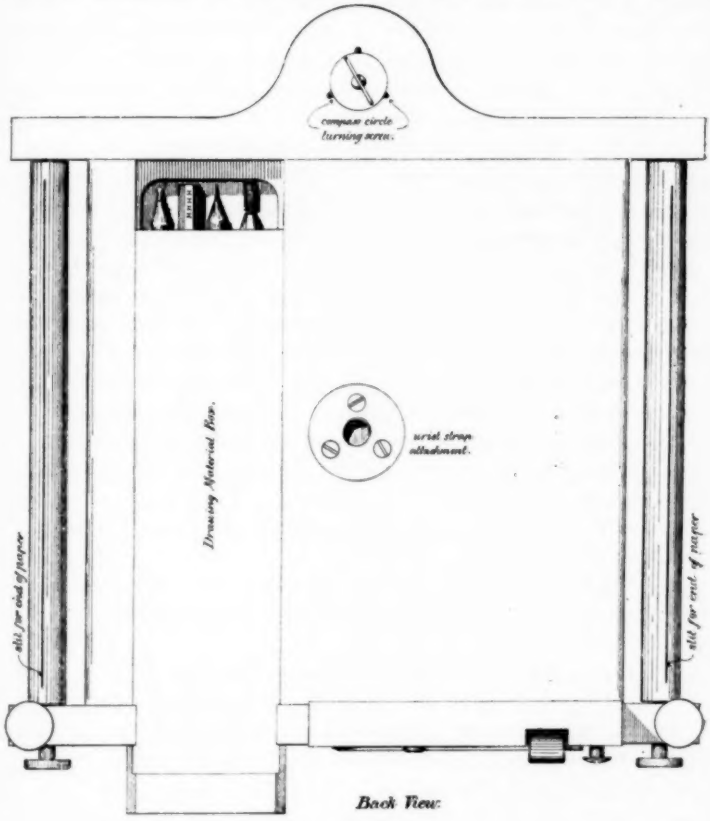


FIG. 4.

needed as clamps because the necessary friction of the rollers is obtained as above explained. Turning either milled head draws the paper toward that roller without the necessity of loosening the other roller. This is an advantage believed to be possessed by no other instrument of this kind.

ADVANTAGES CLAIMED FOR THIS INSTRUMENT.

1. All the necessary instruments are combined into one, facilitating the use both of hands and instruments and preventing loss or mislaying of the tools needed for sketching work. Paper, pencils, ruler, compass, protractor and scales are always ready and in place for use in a manner most convenient and difficult to excel. The position of the paper no longer has to be changed with pins in the face of a wind or on a restless horse. It is no longer necessary to get a compass out of a pocket for a sight and then put it back. There is no need of holding pencils in the mouth or behind the ear. When a ruler is needed it does not have to be got out of pocket or bootleg and returned thereto; and so of other crudities of old methods. Besides, there is no danger that any of these necessary articles will fall to the ground as so often provokingly happens in horseback work.

2. Convenience in holding paper and much of it on rollers.

3. After use of ruler and protractor over a point representing a station, they can be clamped in position, affording accurate continuance of work exactly where left off—without the usual trouble of getting a separate ruler or protractor back into accurate position, as is often found necessary in former methods.

4. Parallel lines can be drawn accurately in any direction.

5. Arrangement for turning and clamping the compass box.

6. Attachment for wrist strap.

7. No unnecessary plotting lines which confuse and disfigure the original map.

8. When an object is sighted on along the ruler, the ruler may then be clamped—a great advantage on a windy day or with a restless horse.

9. Having finished at one station (which will be at zero on the ruler) the ruler can be sighted on the next station and clamped. Travelling directly toward second station any point or intersection on the line between the two is plotted along the clamped ruler by reading off the scale.

10. The ruler is so divided that six or more scales may be used, thus

8	inches	to	one	mile.	Smallest	division	= 12½	yards.
6	"	to	"	"	"	"	= 12½	"
4	"	to	"	"	"	"	= 25	"
3	"	to	"	"	"	"	= 25	"
2	"	to	"	"	"	"	= 50	"
1½	"	to	"	"	"	"	= 50	"

11. Safety and convenience in transportation and in use.

12. Capacity to produce a map complete at any instant and ready for instant use.

ANSWERS

to some objections which have been urged against Lieut. Batson's instrument.

1. That its cost is too great, viz., about $15.00.

Answer. What is the limit of cost?—and by what authority is this limit set?

A good field-glass cannot be bought for less and yet that price is not regarded as prohibitory. Moreover, it is not necessary that every officer should have the instrument as his private property, while it is that he should have a good field-glass. The instrument is one which combines all that is necessary for doing good and reliable reconnaissance work, all in one piece, easily carried in a pouch over the shoulder, no heavier than many field-glasses in general use, ready for instant service and able to turn out a completed map (in colors if desired) ready for use as soon as the observer returns, requiring no after work.

It is not as expensive as an officer's cavalry helmet or a Staff chapeau and equals in cost less than that of two foreign text-books such as Hamley's "Operations of War."

The instrument combines several which must otherwise be had separate. Finally, this instrument raises the grade of work done by it over that done by former methods into the limits of real trustworthiness and accuracy, a result well worth a little extra first cost.

2. That there is no use for the two graduated circles except to aid in putting the meridian on the paper, which is as easily and accurately done with a detachable ruler.

Answer. The very object of this improvement is to do away with detachable or separate tools which are a disadvantage if they can be, with equally good results, dispensed with. When such a separate tool has to be held in place by the hands it cannot always be used with as accurate results as if it formed part of the board itself and were capable of being clamped in any position.

The objects of the large circle are

(A.) To afford means of obtaining universal motion in the ruler, and the Batson method would seem to be better than the other devices.

(*aa*) because, with the Hamilton device or a detachable ruler, it becomes necessary, in order to sight on an object, to watch the dot on the paper representing the observer's station and keep the edge of the ruler adjusted upon it, not always an easy matter.

But with the Batson instrument, having adjusted the zero of the ruler to the station and clamped the large circle, the ruler then simply rotates about a centre representing the station and the observer can sight to all objects desired without paying further attention to that dot.

(*bb*) Having sighted towards an object, in order to lay off its distance by the Batson instrument, it is only necessary to place a dot opposite the division on the scale representing this distance, because the zero of the scale is at the observer's station; whereas, with the Hamilton device or detachable ruler a line must be drawn along the edge of the ruler, the zero of the scale set to the observer's station and the distance then marked off.

(*cc*) An object having been sighted and the ruler clamped (which is so easily done that no time is lost), a line can be drawn without displacing the ruler. This is a great advantage on a windy day or with a restless horse. This convenience is not afforded by a detachable ruler nor by the Hamilton device.

(B.) To give a protractor ready for use without further trouble, for turning off angles, plotting compass readings, etc. This is a great advantage, arising from the use of a circle for the purpose above described.

3. That the scales of yards on the ruler, three inches and four inches to the mile, are seldom used in the field or only used for sighting to a side after estimating distances (the sentence is a quotation whatever it may mean); and that these scales require a step to be called a yard whether walking or trotting, and then that the proper representative fraction be calculated.

Answer. The scales of three inches and four inches to the mile need not be used if not desired. The ruler carries scales of six inches and eight inches to the mile, and the first two mentioned are merely extra optional scales that *may* be used. It is possible to use the ruler for several different scales—see under head of "Description."

The scales marked on the ruler read to 12½ yards. If distance

is to be measured by paces or steps, it is only necessary to determine the number of paces or steps taken in 100 yards. For example, suppose a horse takes 52 alternate steps in 100 yards; then for each time 52 is counted record 100 yards.

4. That there is so much play in the parallel movement of the protractor that it fails to give accurate results after getting the direction and then attempting to transfer the sighting so as to pass through the occupied station.

Answer (*a*). Since this objection was made the parallel motion has been improved, so that play is reduced to a minimum and will give less error than is possible with detached instruments.

(*b*) Parallelism can in any case be obtained by setting the clamping ears of the protractor on corresponding graduations at each side.

5. That the clinometer is merely an assistance in guessing, and that practice soon enables an observer to "guess" with sufficient accuracy; and that, while the graduated arc reads to ten minutes, it is farcical to expect that degree of accuracy in its work.

Answer. If "guessing" be sufficient for the work, no instruments at all are necessary; for practice will undoubtedly develop great skill on the part of an observer. But, as said before, this instrument is intended to introduce a considerable degree of accuracy and reliability in the record obtained by its use, and the clinometer is so attached and can be so used as not to increase the probabilities of bending or breaking.

Suppose the clinometer does become unserviceable; why, its use can be discontinued without interfering with the use of any other part of the instrument and the "guessing" process can be relied on.

The fact that the new rifle of the army is sighted to 1900 yards doesn't mean that it has to be used at that range, and it is "farcical" to suppose that any accurate results can be obtained at that distance. Yet it is not regarded as "farcical" to have the rear sight graduated for that range.

So with this clinometer, while it is graduated to ten minutes of arc, and while with care great accuracy can be obtained, it is not expected that such a degree of refinement will usually be attempted. Yet it is better to have an accurate instrument than a coarse one, if the former can be carried and used as well and read as quickly as the latter, which is the case with this instru-

ment. Moreover, it can be used without turning the board over.

6. That the protractor must be moved to one side in order to fill in details.

Answer. This is equally true also of all detachable rulers and of the Hamilton device, with the addition that a detachable ruler must be returned to pocket or bootleg.

PROMOTIONS IN THE NATIONAL GUARD.

By Captain R. U. SMITH, Vt. N. G.

THIS subject, it seems to me, is one of importance to the welfare of the National Guard. National Guardsmen receive practically no pay for their services, at least not enough to compensate them for the time employed. Frequently, too, their expenses are greater than the pay received.

The men not being well paid, some inducements must be held out to obtain recruits, and, also, to keep them in the service.

Good men are wanted for the National Guard,—it is necessary to its welfare to have them. When a good man enters the service, it is an advantage to keep him.

Our system of giving veteran badges for length of service furnishes an incentive to the men to stay in the National Guard.

One strong motive which prompts men to join the National Guard is the hope of promotion, and nearly every good soldier looks forward to a promotion as an inducement to him to continue his service.

A few years ago officers were elected, the line officers by the men, the field officers by the line officers, etc.

This system was pernicious. A man might be an excellent soldier, worthy of a high position, and yet, as is always the danger in elections, be passed for some more popular man.

I have in mind several instances where men who have had a special military training have entered the National Guard service, stayed a time, and left because after serving a few years, others who were not as well entitled to promotion on the basis I am about to propose were promoted, while they were passed by.

We have taken a long step in the right direction by subjecting the men who are elected to examinations, thus placing some

check on the persons who are chosen, but this method does not insure the best men for officers, as it is only necessary to elect men who can come up to a certain standard.

Appointments might be desirable, were it not for the fact that wherever appointments are made, unless they are made as the result of a system of markings, favoritism is almost sure to creep in, and even if no favoritism is shown as a matter of fact, it is quite apt to be alleged, thus causing dissatisfaction.

The best men in the service should be the ones chosen for officers and our present system of promotions is not one that tends to produce that result. How shall we attain that end?

Have an examining board; when a vacancy occurs, let the candidates for the position pass a competitive examination on military subjects, and let the examining board mark the candidates on that examination.

Faithfulness should be rewarded; to secure that end, have the records of attendance examined, and have percentage of attendance enter into the computation. No one, I think, will be disposed to deny the right of a man to a promotion whose military knowledge is superior and who is regular in his attendance, if anyone is to be promoted.

Let the board average the marks obtained as above, giving each its proper weight, and let the promotions be made on that basis.

Merit should be recognized, and an examining board has generally no interest, except to get the best men for officers.

More good men will enter the National Guard service, and, having entered it, will remain if they can do so with a feeling that if they are faithful and strive to attain a degree of military proficiency, they will be rewarded, according to their deserts.

This method ought to insure the best men for officers, and it would be a good plan to adopt with reference to the non-commissioned officers as well; *mutatis mutandis.*

In the promotion of non-commissioned officers it might be well to take into account proficiency in drill and rifle practice, to be determined by competition.

This would have a direct tendency to encourage a knowledge of drill, and also to encourage rifle practice.

Nearly, if not quite, all officers are at some time non-commissioned officers, passing through this stage, they would become proficient in drill and with the rifle; and when about to become

officers the remaining essentials would be higher knowledge and faithfulness.

It may be urged that men will obey an officer whom they have elected more readily than they will obey any other person.

This is undoubtedly true as regards officers who are appointed, but when men feel that the person promoted fairly earned his promotion, they will respect his ability, and *one of the essentials of good discipline is that men should feel that those who command them are fitted to do so by superior knowledge.*

These are, of course, only the general outlines of a plan—the details would be varied, according to the ideas of those to whom its execution might be intrusted.

The central idea is to have all promotions regulated by competition, thus getting the best men for the offices.

Let me repeat that many young men feel that they cannot afford to spend time in a service where hope of promotion is one of the strongest incentives to that service, unless they can be certain that as they deserve so will they be rewarded.

CERTAIN LAWS CONCERNING THE USE OF TROOPS IN CIVIL DISORDERS.

By Captain PETER LEARY, Jr., 4th U. S. Artillery.

IN anticipation of such civil disorder as may call for the use of military force nothing in the way of preparation should be omitted. Not the general preparation of men and arms but the deliberate and thoughtful formulation of such laws and means of warning to non-rioters, as will start the troops unembarrassed by doubts of their legal responsibilities on one hand, or fears, if innocent persons are killed, on the other.

The history of riots during the past twenty years shows the liability of collision between troops and mobs. While such collisions are in danger of aggravation from the growing complexity of the relations of labor to capital, there is also a phase to be considered, the result of the fact that in every instance of tumult there is a class engaged who are not honest strikers,—the turbulent element, having nothing to lose and everything to gain by riot, arson, and pillage. Mixed with these, however, there are always innocent men, women, and children, drawn by curiosity, ignorant of impending danger, giving perhaps the sympathy of their presence, but intending neither to take any active part in the operations of the mob, nor to knowingly run any personal risk in being on hand. When, during the Astor Place Riot in 1849 the 7th Regiment New York State Militia fired into the mob, many innocent persons were killed and wounded. It is established that many riots in which lives have been taken and valuable property destroyed, would have been quickly suppressed without serious loss, if all who were peaceably disposed and not active rioters in the beginning, had retired to and remained in their homes at the first official notification that public force would be employed.

Looking at the question from the point of view of promptly suppressing such outbreaks with the least danger to innocent persons, and indemnity to commanders for proper military action, it seems that we have reached a point at which humanity calls for a treatment of affairs, free from any jealousy of military power; for there is no possibility that the military power of the United States can ever be used by any man or any party for the

subversion of public liberty, or for any use foreign to the just objects of its maintenance.

It is conceded that no question as to the legality of the use of troops in such cases presents itself to a military commander. After a proclamation by the President of a state of insurrection in any part of the country, and after the use of troops is indicated pursuant to such a proclamation, it is a just presumption that such action is in strict obedience to the laws of the land. No responsibility is thrown on a military commander for any issue in law. His proper superiors have predetermined those questions for him. The only problem confronting him is the one of obeying his orders in the most conscientious and effective way. His military duty is the only one he is called on to do. But while this is obvious, it is equally obvious that the law of military interposition is not so phrased as to protect the officer after the event, from maliciously designed criminal process in local courts. Witness the case of Colonel A. B. Coit, 14th Regiment Ohio National Guard, who, after prosecution, has only been recently acquitted of the charge of manslaughter in a criminal court of his state. For upholding the dignity and honor of the laws of Ohio, and protecting the lives and property of her people, he has been subjected to humiliation and to great expense of money and time for which Ohio has refused to indemnify him.

THE RELATION OF MARTIAL LAW TO MOB VIOLENCE.

It is submitted that the legal principle known to us as martial law gives but little aid in treating the subject. It has been variously interpreted by the courts of the United States as 1.—"The law of military necessity in the actual presence of war administered by the General of the Army." 2.—"It is the will of the general who commands the army. It supersedes all existing civil laws and is regulated by a well-known system or code of laws. The commander is the legislator, judge and executioner. There may or may not be a hearing upon the charges at his will. The law is resorted to only in cases of necessity, which is to be shown affirmatively by the commander who assumes to exercise it." 3.—"In time of insurrection it cannot be applied to citizens in States in which the Courts are open, and their process unobstructed." 4.—"For any abuse of the authority, the officer ordering, and the person committing the act may be liable as trespassers."

Manifestly martial law furnishes no such direction as is needed to meet the conditions. On the contrary its tendency is to neutralize the value of military efficiency by imposing on commanders serious doubts as to the outcome of their official acts and as to their criminal liability before non-military tribunals.

The possibilities call for a system, carefully fixed by law and especially intended to meet the emergencies in the most humane but also in the most prompt and effective way.

Lieutenant Birkhimer expresses the following opinion in the preface to his valuable work "Military Government and Martial Law." "When operating on foreign soil, the legal obligations of the dominant military are tested by one rule; when within their own territory by a wholly different rule, having regard to the civil and property rights of the inhabitants. What may be permissible to the commander in the exercise of his authority in the former, with no responsibility other than to his military superiors, might in the latter subject him to grave civil responsibilities. If it be attempted to throw around the officer in the latter case that immunity from civil liability which attaches to his conduct in the former, the people—his fellow citizens—might, with well-founded apprehensions, view the temporary establishment over them, for even the most laudable purpose, of the rule of military force. If, however, it be understood that this cannot be done; if the principle be established, that the commander who, under any circumstances whatsoever, assumes to enforce superior military power over the people and territory of his own country, does so under ultimate legal responsibility for his acts, military rule is deprived of its terrors, and the law-abiding citizen sees in it nothing except the firm application, for his benefit, of the powerful military hand, when civil institutions have ceased either wholly or at least effectively to perform their appropriate functions. Nor as to this does it signify whether temporary military supremacy results from efforts to repel invasion or to suppress insurrection. The rule of liability is the same in both cases."

The responsibility of the officer to civil and criminal process, during the prevalence of martial law in the actual state of war, being so established, it cannot well be doubted that his responsibility is equally established, when called out by superior authority to enforce the laws in case of strikes and outbreaks of mob violence.

It is a significant fact that of all the great powers of our time,

the United States and Great Britain, the most advanced in public liberty and in respect for law, have done the least, by way of legislative provision, for the prevention or the limitation, if not preventable, of mob violence.

In the territories of these powers the military arm is called into active use, superseding the civil power as a recognition of an actual state of war. In Germany and France special laws are in force for government under similar conditions known as the law of the State of Siege. Both countries are governed by laws passed under the sanction of and in conformity with their organic constitutions.

THE RIOT LAWS OF THE UNITED STATES AND GREAT BRITAIN.

The riot laws of the States composing the federal union are founded on the law known as the Riot Act, 1 George I., St. 2, ch. 5, which makes it the duty of the justice, sheriff, mayor, or other authority, whenever twelve persons or more are unlawfully, riotously and tumultuously assembled together, to the disturbance of the public peace, to resort to the place of such assembly and read the following proclamation: "Our sovereign lady the Queen chargeth and commandeth all persons being assembled immediately to disperse themselves and peaceably to depart to their habitations or to their lawful business upon the pains contained in the act made in the first year of King George for preventing tumultuous and riotous assemblages. God save the Queen."

It is a felony punishable with penal servitude for life to obstruct the reading of the proclamation or to remain or continue together unlawfully, riotously and tumultuously for one hour after the proclamation was made or for one hour after it would have been made but for being hindered.

The general principles of our riot laws are the same, but the penalties are lighter. The procedure of the authorities is practically the same in all the States, as are the conditions which justify the recourse to military force and the responsibilities of commanders of State troops.

The employment, however, of federal troops is prescribed in Article 52, U. S. Army regulations 1896.

Par. 488.—Officers of the army will not permit troops under their command to be used to aid the civil authorities as a posse comitatus, or in execution of the laws, except as provided in the foregoing paragraph (See A. R., 486-487).

Par. 489.—If time will permit, application for the use of troops for such purposes must be forwarded, with statements of all material facts, for the consideration and action of the President; but in case of sudden and unexpected invasion, insurrection, or riot, endangering the public property of the United States, or in case of attempted or threatened robbery or interruption of the United States mails, or other equivalent emergency so imminent as to render it dangerous to await instructions requested through the speediest means of communication, an officer of the army may take such action before the receipt of instructions as the circumstances of the case and the law under which he is acting may justify, and will promptly report his action and the circumstances requiring it to the Adjutant General of the army by telegraph, if possible, for the information of the President.

Par. 490.—In the enforcement of the laws, troops are employed as a part of the military power of the United States, and act under the order of the President as Commander-in-chief. They cannot be directed to act under the orders of any civil officer. The commanding officers of troops so employed are directly responsible to their military superiors. Any unlawful or unauthorized act on their part would not be excusable on the ground of an order or request received by them from a marshal or any other civil officer.

Par. 491.—Troops called into action against a mob forcibly resisting or obstructing the execution of the laws of the United States, or attempting to destroy property belonging to or under the protection of the United States, are governed by the general regulations of the army and apply military tactics in respect to the manner in which they shall act to accomplish the desired end. It is purely a tactical question in what manner they shall use the weapons with which they are armed—whether by fire of musketry and artillery or by use of the bayonet and sabre, or by both, and at what stage of the operations each or either mode of attack shall be employed. This tactical question will be decided by the immediate commander of the troops, according to his judgment of the situation. The fire of troops should be withheld until timely warning has been given to the innocent who may be mingled with the mob. Troops must never fire into a crowd unless ordered by their commanding officer, except that single selected sharpshooters may shoot down individual rioters

who have fired upon or thrown missiles at their troops. As a general rule the bayonet alone should be used against mixed crowds in the first stages of a revolt. Bnt as soon as sufficient warning has been given to enable the innocent to separate themselves from the guilty, the action of the troops should be governed solely by the tactical considerations involved in the duty they are ordered to perform. They should make their blows so effective as to promptly suppress all resistance to lawful authority, and should stop the destruction of life the moment lawless resistance has ceased. Punishment belongs not to the troops, but to the courts of justice."

THE RIOT LAWS OF THE GERMAN EMPIRE.

The following are the regulations of the German Empire for the use of troops in the state of siege.—

In Germany, a distinction exists between the state of siege in (a) "The Territory of the whole Empire," (b) the Kingdom of Prussia, (c) the "Reichsland," or the Territories of Alsace-Lorraine.

(*a*) *The Territory of the Whole Empire.*—

The declaration of the state of siege in this case is regulated by the provisions of article 68 of the Constitution of the Empire, as follows:

Art. 68.—The Emperor shall have the power, if public security within the Federal Territory demands it, to declare martial law (Kriegszustand)* in any part of the Empire; and until the publication of a law regulating the occasions, the form of announcement, and the effects of such a declaration, the provisions of the Prussian law of June 4, 1851, shall be considered in force.

The state of siege is thus defined in Colonel E. Hartmann's "Militär-Hand-Wörterbuch für Armee und Marine":

The state of siege (Belagerungszustand) signifies the passing of every species of public authority to the military officials, to whom are thereby granted extraordinary powers. The state of siege may be declared in a city, a fortress, a district, etc. In the German Empire, (with the exception of Bavaria) the right belongs to the Emperor to declare the state of war to exist (Kriegszustand) in any part of the federal territory where the public safety is threatened. In case of war, every commander of a fortress situated in a province threatened by the enemy has the

* Literally "State of War."

power to declare the state of siege to exist for his fortress and the territory depending thereon ; for other districts the right to make this declaration belongs to the commanding general (corps commander). The declaration of the state of siege is dependent upon the previous declaration of the state of war."

The provisions of the Prussian law of the 4th June, 1851, are given under the head of the Kingdom of Prussia.

(*b*) *The Kingdom of Prussia.*—

(The state of siege.—Law of the 4th of June, 1851.)

1. In case of war, and in those provinces threatened or already occupied by the enemy, any fortress and the territory depending thereon may, for the purpose of defense, be declared in a state of siege by the fortress commander, and any army corps district or portion thereof, may be so declared by the corps commander.

2. In case of riots also, when the danger to the public safety is urgent, the state of siege may be declared either in time of war or peace.

The declaration of the state of siege then issues from the Ministry of State; it may, however, in urgent cases, with reference to particular places and districts, be issued provisionally by the highest military commander of the jurisdiction, on the application of the chief of the administration of the governmental district, and in case there is danger in delay, without such application. The declaration of the state of siege in such cases is, however, subject to the approval or the disapproval of the Ministry of State.

In fortresses, the provisional declaration of the state of siege issues from the fortress commander.

3. The declaration of the state of siege is to be announced by the beating of drums or the sounding of trumpets, and, in addition, the public are to be made generally acquainted therewith by means of communications to the town authorities, posters in public places, and also through the public press. The raising of the state of siege will be made a matter of general knowledge by means of announcements to the authorities of the towns and through the public press.

4. After the proclamation and declaration of the state of siege, the executive authority passes to the superior military commander. The authorities of the civil administration and of the towns are obliged to comply with the orders and demands of the superior military commander.

The superior military authorities in question are personally responsible for the orders that they issue.

5. If, on the declaration of the state of siege, it is deemed necessary to suspend articles 5, 6, 7, 27, 28, 29, 30 and 36 of the Constitution, or any of them, for the time and for the district, then it must be expressly so specified in the proclamation on the declaration of the state of siege, or else it must be announced in a special order, which is to be made known according to the proper forms (Par. 3).

The suspension of the above-mentioned articles, or any of them, is permissible for that district only which is declared in a state of siege, and only while the state of seige continues.

6. During the state of siege all military persons are subject to the laws which apply to a state of war. * * *

7. In places or districts declared in a state of siege, the higher military jurisdiction over all military persons belonging to the garrison is in the hands of the commander of the garrison (in fortresses, the commandant).

To this officer belongs also the right to confirm all military judgments affecting such persons, excepting only condemnations to death in time of peace; these must be submitted for the approval of the commanding general of the province.

With reference to the lower jurisdiction the provisions of the military penal code remain in force.

(c) *The Reichsland, or Territories of Alsace-Lorraine.*—

(Preparation for the State of War in Alsace-Lorraine.—Law of the 30th May, 1892.)

Until a law on the state of war is passed which shall apply to the entire federal territory, the following regulations shall hold good for Alsace-Lorraine, and shall be in force from the day of their promulgation.

In the event of war, or in case danger of a hostile attack shall be imminent, every superior military commander holding a grade not lower than that of a field-officer, may provisionally assume the discharge of all executive powers for the purpose of the defense of the place or district under his command, until such time as the Emperor may decide whether the state of war shall be decreed, prompt report of the circumstances being made to him.

The assumption of executive powers is made by a proclamation by the superior military commander addressed to the civil administrative authorities of the place or district in question.

This proclamation is to be made known to the public in accordance with local custom.

The authorities of the civil administration and of the towns are obliged to comply with the orders and demands of the military commander. For their orders and demands the military commanders in question are personally responsible.

Concerning the orders issued, a report must be made to the Federal Council and to the Diet, either immediately or else at their next meeting.

Extracts from the "Dienstvorschriften" (Service regulations) for the Royal Prussian army, edition compiled by Colonel Karl v. Helldorff, Berlin, 1895.*

(Relations of the military to the civil authorities when the military is ordered to the assistance of the latter.)

8. Whenever the military is ordered to the assistance of the civil authority, the military and its commander, not the civil authority, are to judge whether and in what manner arms shall be used. Whenever the civil authority requests the assistance of the military, the object and purpose for which assistance is sought must be stated so definitely as to enable the military to make suitable arrangements.

(Law of August 17, 1835, for the preservation of public order and of the respect due to law.—Extract.)

8. When a military force intervenes in a riot to disperse the mob and restore order, the officer or non-commissioned officer will order the mob to disperse, and enforce obedience by force of arms, if the mob fails to obey his order or his signal made by beating the drum or sounding the trumpet twice repeated.

9. If the military forces are forcibly resisted or attacked with arms or implements dangerous to life or limb, if stones or other objects are thrown at them, the armed forces, upon the order of their commander, are justified in firing on the mob.

10. The facts are established by an official report of the commander. In his report he has to give information on the following points:

* See p. 3. Art. 5: Guarantee of personal liberty. Art. 6: Inviolability of the domicile. Art. 7: No one to be judged, except by the lawful tribunals. Art. 27: Guarantee of freedom of speech and of the press. Art. 28: Manner of punishing libels, etc. Art. 29: Guarantee of right to assemble peaceably, etc. Art. 30: Guarantee of right to form associations. Art. 36: Limitations on right to employ the military for the suppression of civil disorders, etc.

The cause of his intervention, his orders to the mob, whether or not it was necessary to repeat them and the effect thereof whether forcible resistance was offered, in what it consisted, whether on the part of the rioters an attack was made with arms or other instruments, whether stones or other things were thrown, whether and what use he made of arms, particularly fire-arms, and in what manner he quelled the riot; lastly, whether any, and what damage was done to persons or things.

If more than one commander were engaged, the senior in rank renders the report, the reports of the others being enclosed in so far as they acted separately as regards time and place. The detailed account of the damage to persons and things is, if necessary, rendered by the police, and is furnished to the commander and forms part of his report.

Laws of March 28, 1872, for Alsace-Lorraine, concerning the use of arms by the military in peace.)

1. The military, acting in our service for the preservation of public order, quiet and safety, are authorized, when on guard and post, on patrol, transport, and all other details, even when the details are made upon request or for the assistance of the civil anthority, to make use of their arms in the following cases enumerated in paragraphs 2-7.

2. If the troops which are ordered out on one of the above mentioned services are attacked, or are seriously threatened by an attack, or if they are resisted by force, or threats of violence, they will make use of their arms to repulse the attack and overpower the resistance.

3. Whenever the military ordered out on such services call upon the mob to lay down their arms or other instruments suitable for attack or defense, or otherwise dangerous, and such order is not immediately obeyed, or if the arms or other instruments, previously laid down, are resumed, the military will make use of its arms in order to enforce the obedience due it.

4. When an armed force intervenes in a riot to disperse the mob and restore order, the commander of the troops will order the mob to disperse, and compel the requisite obedience by force of arms, if the mob fails to obey his order or signal made by beating the drum or sounding the trumpet, twice repeated.

5. When a person is arrested and escapes or attempts to escape, the troops will use their arms to prevent such escape.

6. The troops are authorized to use their arms when prisoners

turned over to them for escort or safe keeping, seek to escape while *en route* to or from the prison.

7. Every sentry (inclusive of posts of honor) has, if necessary, to make use of his arms for the protection of the person or things he is to guard.

8. Troops may make use of their arms only so far as is necessary for the accomplishing the objects enumerated in pars. 2–7.

Fire-arms may only be used when either a special order is given therefor, or when the other arms seem insufficient to the end. The time when and the manner in which arms may be used, must in each case be decided by the military on the spot.

9. When the military is ordered to assist the civil authority, the military and its commander, not the civil authority, are to judge when and in what manner the arms should be resorted to. Whenever the civil authority requests the assistance of the military, the object and purpose for which assistance is sought must be stated so definitely as to enable the military to make suitable arrangements.

10. Whenever any one has been hurt by the use of arms on the part of the military, it becomes the duty of the latter, as soon as the circumstances permit, to inform the nearest police office; it then becomes the duty of the police to care for the wounded and cause the necessary judicial investigation.

11. It is presumed that in resorting to the use of arms, the military have acted within the limits of their authority, until the contrary is proven. The testimony of such persons as are guilty or suspected of participation in those acts which have caused the intervention of the military, does not constitute by itself proof of the abuse of arms by the military sufficient to subject the military to punishment.

The Riot Laws of the French Republic.—

(The law of France concerning the State of Siege, April 3, 1878, is as follows.)

Art. 1. "The state of siege may be declared in case of imminent peril only, resulting from a foreign war or an armed insurrection. The state of siege can only be declared by a special law and this law shall designate the towns, districts, or departments to which it applies. It also fixes the time the state of siege shall last. At the expiration of this time, the state of siege ceases legally, unless its operation is prolonged by a new law.

Art. 2. In case the Chambers are not in session, the President of the Republic may declare the state of siege, on the advice of the council of ministers, but the legal effect thereof is that the Chambers shall convene two days after the declaration.

Art. 3. In case of the dissolution of the Chamber of Deputies, and until the operations of a new election are completely fulfilled, the state of siege cannot be declared, even provisionally, by the President of the Republic. Nevertheless, in case of a foreign war, the President, on the advice of the council of ministers, may declare the state of siege in the territory threatened by the enemy, on condition of assembling the electoral colleges and of convoking the Chambers with as little delay as possible.

Art. 4. In case communications should be interrupted with Algeria, the governor may declare the whole or part of Algeria in a state of siege, conforming to the conditions of the present law.

Art. 5. In the cases provided for in Articles 2 and 3, the Chambers, as soon as they convene, maintain or raise the state of siege. In case of disagreement between the Chambers, the state of siege is legally raised.

Art. 6. Articles 4 and 5 of the Law of the 9th August, 1849, are continued in force, as well as the provisions of its other articles not contrary to the present law.

The Law of the 9th August, 1849, and the other laws and regulations, bearing on the subject of the employment of the military to suppress disorders, etc., will be found in the pamphlet, *Instructions en Cas de Troubles, Paris, 1895.*

The following are taken from those instructions:

3. No troops may be employed even in the town where they are established, except in pursuance of written requisition, made by the authorities which have the right, the prefect, under-prefect or other authorized civil officer.

4. Every action of the troops should be the result of a previous agreement between the military and the civil authority.

5. These requisitions should indicate clearly the end to be attained, while leaving at all times to the military commander the choice of the means for the attainment of the desired end.

6. In case of a flagrant crime or of urgency, he shall not wait for a written requisition. He shall immediately take measures which he judges necessary to disperse the mob or prevent aggression.

7. There is no exception to Rules 1 and 2 except in case of flagrant crime or great urgency when time and means for a reply are absolutely lacking.

9. It follows from the text of the laws upon the matter, that the civil functionary who is responsible for the maintenance of order (save in territory in the state of siege) shall take the direction of the police and shall remain sole judge of the proper time when the armed force may be called out.

10. But the military authority must not let itself be found unprepared for a requisition for troops. To this end, it must receive a first warning as soon as the public peace seems menaced and if the situation become graver the civil authorities shall again send information to the commander of the armed force, to prepare to intervene promptly, either by means of precaution or by manœuvres which shall paralyze the mob, so that the moment he acts on his own responsibility, his action shall be prompt and efficacious. Such is the object of the previous instructions formally prescribed in Article 16 of the Laws of July 10, 1791.

The commanders of troops, posts, guards, pickets, or patrols must not lose sight of the responsibilities relating to requisitions imposed on them by Article 19, Law of July 10, 1791, Article 41, Law of August 3, 1791, Article 64, rules for service in towns, and Article 234, ordinary penal code.

Riots.—

11. Riots in public roads or squares will not be tolerated and should be summoned to disperse.

Public Proclamations.—

12. Force or arms will never be employed by military commanders, except after the summons made as indicated in Articles 26 and 27, Law of August 3, 1791, and Article 169 of the Regulations for employment of troops in public places.

13. Nevertheless Article 25 of the same law prescribes that military commanders may use force of arms *without summons* in the three following cases:

1. If violence is used against the military forces, as where they are assailed by musketry or any kind of projectiles.

2. If they cannot otherwise defend the ground which they hold or the posts which they are guarding.

3. If they are expressly authorized in writing by the civil authority and only after the formalities prescribed in Articles 26 and 27, Law of August 3, 1791.

Territories in the State of Siege.—

14. The declaration of the state of siege, having for its immediate effect the transfer to the military authorities of all powers formerly exercised by the civil authorities, it follows that the military commander has no further need of the presence of a civil officer for making the public proclamation or summons. He may make it as of his own authority, and act entirely pursuant to the prescriptions in the law of 1791.

(Instructions for the employment of troops in case of insurrection.)

15. The programme and rôle of the army should be to maintain order under the laws and decisions of the sovereign authority of the country, while discouraging rigorously all political aspirations.

16. The army should lend assistance to the gendarmes and local police, and obey the legal requisitions for the maintenance of public security and order.

17. Every kind of boisterous crying out, of songs and of whistling or hissing will be rigorously prevented, and every disorderly assemblage dispersed. Every insult or public altercation between citizens and with greater reason every collision will be immediately dealt with.

18. Each commander of troops or detachments, should study in advance the safest measures to use in case of riot, in concert, if possible, with the civil authorities.

19. If, in a fortified place, or a garrisoned city, any trouble should suddenly occur, the officers, the sub-officers and the soldiers should immediately report to their respective quarters and remain there to wait for orders.

20. Officers who room in the neighborhood of barracks shall report there immediately; those who room at too great a distance, or in quarters where hostile assemblages might meet, shall remain in their quarters, and the adjutant of the regiment shall immediately send a sufficiently strong patrol, commanded by an officer, to go through the streets inhabited by officers who have not been able to report at quarters. These latter should hold themselves ready to join the patrol when in its passage opposite their lodgings.

21. The forces must not be divided up, but they shall be kept together, grouped so as to act with vigor. However, if the effective strength of the garrison permits it, the principal points from which the mob may be surrounded shall be occupied. In a large

city the places which command the principal avenues shall be occupied; also the hotel of the prefecture and that of the general commanding, the prison, the hospital, the railroad depots, the office of the paymaster-general, etc. In a city in time of war the gates shall be seized and closed if necessary. In a small town the Hotel-de-Ville, the mayor's office or some other dominant points shall be seized.

22. It is of the greatest importance that the soldiers preserve their prestige and be neither insulted nor molested; because if they should lose their moral force, order could no longer be preserved, except by violent measures. It is necessary then to avoid as far as possible any communication between the troops and agitators, and for the former to act with vigor when their intervention is indispensable. Absolute rules cannot be laid down in such a matter, but as soon as trouble is feared, then consign the troops to barracks and do not put them in movement until circumstances demand their intervention. Then their action, announced in advance as irresistible, should be prompt, resolute, and decisive. This is the best means to avoid collision, before which, however, they should not recoil, if it is necessary, because force should always remain with the law.

23. As soon as a riot takes place, or as soon as the third summons has been made without accomplishing any result, force should be employed without delay and without hesitation.

24. There should never be any question as to complying with requests made by mobs, to sheathe the bayonet, elevate pieces in air, hand over arms or evacuate a position. Any such transaction with rioters is either cowardice or treason.

25. Chiefs of detachments should themselves abstain from conversation with the public and should prevent the men from so doing, especially with the people who present themselves under the guise of conciliators.

26. It is especially necessary to hold the people off at such a distance, that they cannot harangue the soldiers or throw themselves suddenly on their arms. On arriving upon a boulevard, place, or street the commander of the troops should immediately make every one evacuate the ground he is to occupy and let no one come in.

27. Intercourse should cease immediately at the place seized by the troops. No one should be allowed to pass but the military or those furnished with proper authority.

28. The public shall be held at a distance of at least one hundred metres from the troops by the sentinels, who should not engage in any conversation with the crowd. They should not remain in one place and should repel every act of violence by force, and every attempt which might be made to snatch from them their weapons.

29. The chiefs of detachments shall declare in a loud and firm voice that the sentinels are forced and that this violence would be considered as an act of hostility which would be repelled by force of arms.

30. All these measures should be taken rapidly and without hesitation, for every minute's delay augments the moral and material strength of the mob.

Combat With a Mob.—

31. As far as possible avoid getting near a mob when they are behind barricades or under cover. Endeavor to turn the defenses of the mob by the unoccupied adjacent streets, or else go through the houses.

32. The detachments formed for this end should consist of regularly appointed component parts and should be accompanied by the engineer corps furnished with proper tools.

33. The doors of the houses may be easily forced by blows of a hatchet or with levers or crow-bars. If they are not barricaded a ball, shot into the lock, will be sufficient to open them.

34. More rapid work may be done with large petards or dynamite cartridges.

35. While some are endeavoring to force a house door, artillerymen, sheltered as far as possible in the embrasures of the doors, or ambuscaded in the windows of the neighboring houses, will keep strict watch over the barricades and the houses where the insurgents are, and will hold the windows in range so as to fire on all who present themselves.

36. In order to pass from one house to another break through the separating walls, which are generally not very thick, especially in the upper stories.

37. The strength of the detachments called out to be introduced into houses should not exceed 25 or 30 men, commanded by an officer. A greater number would produce confusion and disorder without aiding the work. Two or three men only can work at a time, and the rest should hold themselves ready to re-

pulse or to drive out the insurgents who are in the houses which are attacked.

38. If a barricade cannot be turned and the attack from the front fails, the commander should fight it at first with men placed in the windows of houses which are in front, then charge on the obstacle, with twenty-five or thirty men at the most, under an energetic officer.

39. They should be followed by two ranks of marksmen, marching rapidly on each side of the street, along the houses, to oppose the insurgents placed in the windows of the houses near the barricades. The rank on the right will fire on all who present themselves on the left, and the rank on the left on those who appear at the windows at the right.

40. Hold by preference to the right side of the street, because the defenders of the houses placed at the windows have more difficulty in firing with exactness on the assailants.

Employment of Artillery.—

41. The employment of artillery is nearly always advantageous. It exercises a puissant action on the courage and *morale* of the insurgents.

Shells or grape-shot are fired at the barricades or houses to demolish them, to open a breach, or to drive from them the defenders. Fire canister in the large avenues to disperse armed groups.

42. As in combat with the insurgents cannon cannot be employed except at short range, it is necessary, in order to keep the men and horses safe, to post the pieces under shelter, then to push them as rapidly as possible by hand to the position from which they can fire upon the barricade or the houses to be stormed.

43. Some one should come from the post with the planks, mattresses, etc., for the gunners.

44. If the resistance has been able to organize and to concentrate its means of action in a special quarter, this quarter should be completely surrounded by troops and closed in on from all sides at the same time, at a given signal, or at a moment agreed upon in advance.

45. If the mob dares at any time to take the offensive by charging, several discharges, either with cannon charged with canister, or of musketry upon the head of the column, will suffice to oblige them to retire. A charge with bayonets fixed will finish routing them.

46. The pursuit commenced, it is expedient to prolong it while closing in on the rioters, so as to prevent the possibility of their installing themselves behind the barricades or in the houses in their rear.

47. If, in any way, an isolated detachment finds itself to be too much pressed during an engagement with the mob it should establish itself in a house or on some other point more easy to guard and near that which it occupies, and should defend itself energetically, holding back the superior force, and should wait for succor, but under no pretext should it enter into parley with the insurgents.

Employment of Cavalry.—

48. Cavalry, whose rôle it is in the beginning, to maintain or facilitate communications, to oblige assemblies to disperse, and to act in streets and on boulevards, in which there are no material obstacles, either in riding directly on the insurgents, or especially in menancing their retreat, should, when the rioters retire, ride actively in pursuit, unless it is apprehended that they may divide to produce more effect.

49. Finally it is important not to lose sight of the fact that the action should not cease because the insurrection is apparently quelled. This is the moment to look again for the fractions of the mob, especially where they may hide, and to seize and disarm them; to search the houses in order to seize the arms and munitions; to proceed to the arrest of the ringleaders.

50. These perquisitions should not cease except when they have become entirely unprofitable.

Movable Columns.—

51. When there is reason to fear that troubles are going to occur in a place where there is no garrison, or that bands of rioters will run through the country to inspire terror, to burn or to pillage, mobile columns will be formed to reëstablish order.

52. These mobile columns will be formed of infantry, cavalry, or artillery, or of these arms combined.

53. In every case they will be sufficiently strong to remove from the rioters every idea of resistance to the armed band, and also strong enough to immediately establish the public peace.

54. Should a commander not have enough of troops to send out sufficiently strong columns he will deal with mobs successively, but a column, in no case, should be exposed to failure, for

that would destroy the moral force of the troops, and would raise that of the mob.

55. It cannot be emphasized too strongly that when the armed force appears its action should be irresistible and decisive.

56. If the column is composed only of infantry it takes position around the locality in order to reconnoitre the point of attack, and if the obstacles are not too great, as soon as the arrangement of the defenses has been looked over, one or two small columns of twenty or thirty men each will charge, who will penetrate by the principal streets to the Hotel-de-Ville or to the town hall, which is generally the centre of resistance; they are followed by reinforcements who will guard their rear and who will take position, if necessary, in the houses. The rest of the column will then spread out towards the streets, will penetrate into the town and occupy the principal points, until the searches and arrests are finished.

57. The troops, during their stay, will be lodged by the inhabitants, but by groups—the officers in the midst of their men.

58. Discipline will be observed with the greatest rigor.

59. A general post will be established immediately. The town must be patrolled incessantly.

60. Cavalry alone is proper to pursue any bands who traverse the country pillaging and ravaging.

61. It may be employed ultimately to guard the gates of the town, to ride rapidly on a place where popular agitation begins, and to foil this attempt by its sudden arrival.

62. But, in order to enter alone into a town it is necessary for it to be numerous, and that part of the riders dismount, and fight as foot soldiers.

63. To infantry, as well as to cavalry, artillery lends an efficacious, material and moral support. For the most part the announcement of its approach suffices to dispel all idea of resistance.

64. In fine, if a mobile column is composed of the three arms it will be in a condition to break up every kind of resistance.

The cavalry will be in advance to observe the entrances of the insurgent town, to intimidate the defenders, by the promptitude of its arrival, and to arrest those people who are most compromised from escaping.

The infantry and artillery who will come later will overthrow all obstacles or barricades and will subjugate the mob.

65. Detachments of gendarmes, taken from the district and well acquainted with localities and persons, will march with the mobile columns to inform them, and to proceed with the arrests and with the verbal process.

66. If magistrates surrender in the insurgent districts, the columns will protect them and will furnish them all possible means to facilitate their mission, to proceed to arrests, and furnish escorts for prisoners.

Instructions for the Formation of Mobile Columns.—

67. Mobile columns, formed after the orders given, should be organized in advance, in such a way that the mobilizations may take place in a few hours, and the departure immediately afterwards.

68. The chiefs of column, especially if they are composed of troops of different arms, should in advance put themselves in communication with the commanders of separate parts and give them instructions in case of mobilization. They will assure themselves that the men are furnished with all that they should carry with them.

69. An officer should be selected from each column to perform the duties of *sous intendant.* He will take instructions about all that which concerns the administration and the subsistence of his column at the time it is mobilized. (The *sous intendant* is probably the same as quartermaster and commissary in the U. S. army.)

70. Another officer, designated to perform the duties of chief-of-staff, will take from the general commanding all dispatches, documents and instructions necessary for the accomplishment of the mission which has devolved upon the column.

71. The infantry should carry a full supply of cartridges. They will have in their haversacks, along with indispensable effects, only a day's ration in reserve, and a ration of sugar and of coffee.

72. They will carry the shelter tents, blankets and camp utensils.

73. The cavalry will have a day's feed of oats.

74. As far as possible, the troops will be quartered with the inhabitants, but by groups and not isolated, the officers being lodged with their companies.

75. The chiefs of detachments and of columns will make report, hierarchically, of their operations to their general of brigade, who will transmit these reports to the general of division, but, in

case of urgency, a report will be addressed by them directly to the general of division. These reports will contain an exposition of the operations executed, of the political state and especially of all that that concerns the installation and subsistence of the troops.

Laws and Regulations.—

(Extract from the Law of July 10, 1791.)

Art. 9. In every district the general commanding charged with enforcing the military regulations will, in general, be obliged to concert with the civil authorities, in order to procure the execution of all the measures or precautions which they have been able to take for the maintenance of the public peace, or for the observance of the laws, in such a manner as to obey their demands.

Art. 13. The commanders especially will conform, in their respective places, to what is prescribed in Art. 9 of the present law for the general commanding in the division.

Art. 16. In all circumstances which interest the police, order, the interior tranquility of places and where the participation of the troops may be judged necessary, the military commander will act only after a written request from the civil officers has been received, and, as far as he may do it, only after he has had a consultation with them.

Art. 17. In consequence, when he does act, either after temporary arrangement or after permanent precautions, such as regular patrols, detachments for the maintenance of order or the execution of the laws, police, of fairs, markets or of other public places, etc., the civil officers will send to the military commandant a requisition signed by themselves of which the divers objects shall be clearly explained or detailed, and in which they will designate the extent of the guard which they believe necessary, after which, the execution of the arrangements and all measures for enforcing them, such as sentinels' orders, placing of sentinels, bivouacs, conduct and direction of patrols, situation of guards and detachments, choice of troops and arms, and all other modes of execution shall be left to the direction of the military commandant, who will be responsible for them, as far as he has been notified by the civil officers that these precautions are necessary or that they should take another direction.

Art. 19. No troop shall change from the garrison in which it has been stationed except by an order to that effect from the

government, or, in urgent cases, from agents of the military authority to whom this power has been given.

(Extract from Law of August 3, 1791.)

Art. 20. No corps or detachment of troops of the line may act in the interior of the Kingdom without a legal requisition, under the penalties imposed by the laws.

Art. 22. Requisitions addressed to the commandants, either of troops of the line, national guards, or national gendarmerie will be written in the following form:

"We ————, require in virtue of the, law, N————, commanding, etc., to lend the aid of troops of the line, or of the national gendarmerie, or of the national guard, necessary for ————. For the guarantee of said commandants we here place our signature.

Sign. ————
————."

Art. 23. The execution of military arrangements will belong entirely to troops of the line. If he has to call out troops of the line from their stations "the determination of their number is left to the officer commanding on his own responsiblility."

Art. 25. The depositary (trustee) of the public forces, either to assume the execution of the law, of judgment or orders, or mandate of justice or of police, or to break up popular mobs and seditious uprisings, and to seize the ringleaders or instigators of the mob or sedition, may only use force of arms in three cases.

First. If any violence or force is used against themselves.

Second. If they cannot otherwise defend the ground they hold or the posts of which they have charge.

Third. If they are expressly authorized by a civil officer, and in this third case, after the formalities prescribed by the two following articles:

Art. 26. If, on account of the progress of a mob, or popular uprising, or for any other cause, vigorous use of force becomes necessary, a civil officer, either a justice of the peace, or a municipal officer, procureur of the commune, or police commissioner, an administrator of district or of department, or a procureur syndic or procureur general syndic, will present himself at the place of the mob or uprising and will pronounce these words in a loud voice, "Obey the law. Force will be employed. Let all good citizens retire," while drummer beats a roll "to charge" at each summons.

Art. 27, Law of August 3, 1791. After this summons, three times repeated and even, in the case in which, after a first or a second summons, it will not be possible to make a second or third, if the persons in the mob do not retire peaceably, and even if there remain more than fifteen together, in a state of resistance, the force of arms will be instantly employed against the seditious without any responsibility for the consequences, and those who are seized will be handed over to the police officers, to be judged and punished according to the rigor of the law.

Art 41. The chiefs of troops of the line, of the national gendarmerie, of guards of cities, or of the national guard, who refuse to execute the demands which are made on them will be pursued and punished by the penalties imposed by the Penal Code, without prejudice of the graver penalties pronounced by the law against crimes threatening the public peace.

(Extract from the Law of April 10, 1831.)

Art. 1. All persons who form riotous assemblies upon the public highways will be required to disperse at the first summons of prefects, under-prefects, mayors, mayors' assistants, or of all magistrates and civil officers charged with judgment of police, other than the *Gardes Champetres* and *Gardes Forestiers*.

If the mob does not disperse the summons will be renewed three times; each one of these will be preceded by a roll of the drum, or a blast from a trumpet. If the three summons are useless, force will be employed in accordance to the Law of August 3, 1791.

(Extract from the Law on Riots, of June 7, 1848.)

Art. 1. Every armed riotous assembly formed on the public highway is forbidden. Equally every unarmed riotous assembly on the public highway is forbidden which might disturb the public peace.

Art. 2. The mob is armed, first, when several of the persons who compose it carry concealed or visible weapons; secondly, when a single one of the individuals carrying visible weapons is not immediately driven out from the mob by all who form part of it.

Art. 3. When an armed or unarmed mob is formed on the public highway, the mayor or one of his assistants, or in case of their absence the police commissioner or any agent or depositary of the public power, and of executive power, carrying the tri-

colored sash, will go to the place where the mob is. A roll of the drum will announce the arrival of the magistrate. If the mob is armed the magistrate will call on them to disperse and retire.

This first summons being without effect, a second summons, preceded by a roll of the drum, will be made by the magistrate.

In case of resistance the mob will be driven away by force. If the mob is unarmed the magistrate, after the first roll of the drum, will call upon the citizens to disperse. If they do not retire three summons will be made successively. In case of resistance the mob will be scattered by force. Extract from the ministerial letter of March 16, 1848, at Paris:

* * * * "You may delegate the powers which belong to you, of replying to summons, to those of the commandants, your subordinates, who, on account of their remoteness or isolation, have not easy communication with you, under the express condition of rendering to you an immediate report. You will use this power wisely in order to maintain the unity of the command. You will pay close attention to the maintenance of discipline and to the execution of the military regulations.

(Signed) "SUBERVIE."

"PARIS, May 10, 1848.

"You must remember that you should obey demands only with troops at your disposal, and you must not regard those troops as dispensible, who are under orders from the Minister of War.

(Signed) "CHARRAS."

Finally on the 20th June, 1848, the Minister of War, General Cavaignac, reproduced the circular of March 16, and ordered rigorous observation of it to the letter.

(Law of August 9, 1849, on the state of siege.)

Art. 1. State of siege may only be declared in case of imminent peril, for external and interior security.

(About forms of declaration of state of siege.)

Art. 2. The National Assembly alone can declare the state of siege save in the exceptions here cited:

The declaration of the state of siege designates the corporations, parishes, or departments to which it applies and can be extended.

Art. 3. In the case of prorogation of the National Assembly

the President of the Republic may declare the state of siege on the advice of a council of his ministers.

(On the effects of the state of siege.)

Art. 7. As soon as the state of siege is declared the powers with which the civil authority has been vested for the maintenance of order and of the police, pass entirely over to the military authority. The civil authority nevertheless continues to exercise those of their powers of which the military authority has not dispossessed them.

Art. 8. The military tribunes can be seized for cognizance of crimes and offenses against the safety of the Republic, the Constitution, against order of public peace, whatever may be the station of the principal instigators and accomplices.

Art. 89. The military authority has the right:

1. Of search, by day or night, in the houses of citizens.

2. To remove prisoners in jail, and those individuals who have not their domicile in places covered by the state of siege.

3. To order the seizure of arms and munitions, and to proceed to seek for them.

4. To forbid publications and reunions which they judge from their nature will incite or encourage disorder.

(Raising of the state of siege.)

Art. 12. The National Assembly alone has the right to raise the state of siege when it has been declared or maintained by it.

Nevertheless, in case of progoration this right will belong to the President of the Republic. The state of siege declared according to Art. 3, may be raised by the President of the Republic, in so much as it has not been maintained by the National Assembly.

Art. 13. After the raising of the state of siege the military tribunes will continue to recognize crimes and offenses, the prosecution of which has been begun by them.

(Regulation of March 1, 1854 on the service of the Gendarmerie.)

Art. 113. If the reports of the service indicate any popular mob or seditious uprising, the prefects, after having consulted with the general officer commanding the department, if he be present, and with the highest officer in rank of the gendarmerie in the residence at the chief manor house of the department, may require the union at the menaced point of the number of brigades necessary to establish order and peace. An account of the affair must be immediately rendered to the Minister of the In-

terior by the prefect, and to the Minister of War by the general officer or officer of the gendarmerie.

Art. 129. In all the previous cases by Articles 113, 114 of the present decree, if the maintenance or establishment of order cannot be assured, except by deploying a still larger force on the menaced point, the generals commanding the division and military subdivisions, independently of the employment of troops of the line, may order, upon the requisition of the prefects, the formation of detachments of gendarmerie, who will perform the duties of the service.

These detachments may be composed of men taken from the neighboring companies of the same military division. But, on account of the orders made by the Ministers of the Interior and of War, the general officers cannot assemble all the brigades of gendarmerie and move them from one department to another.

The prefects of the respective departments will prevent these movements.

Art. 136. If the officers of the gendarmerie recognize that an additional force is necessary in order to break up a seditious assembly, or to repress crimes, to transfer a considerable number of prisoners, to assure, in fine, the execution of the demands of the civil authority, they will immediately acquaint the prefects, or under-prefects with this, who will require either the commander of the department or the commandant of place to support the action of the gendarmerie by a sufficient number of troops of the line. The demands of the officers of the gendarmerie will contain the extract from the order or the requisition, and the motives for which assistance is demanded.

Art. 137. In urgent cases, the officers and under-officers of the gendarmerie may require directly the assistance of troops of the line, who are obliged to wait for their requisitions and lend immediate assistance. They will conform, for this service, to the second paragraph of the preceding article (136).

All military force in active service or on leave is obliged to lend aid to the agents of the public force, in conformity to Article 106 of the code of criminal instructions, and Art. 475 of the penal code (Circular of June 23, 1869).

Art. 138. When a detachment of troops of the line is employed jointly with the gendarmerie for a service, the command will belong, if grades are equal, to the officer of the last arm. If

the chief of detachment is of superior grade to the officer of the gendarmerie, he will take command.

But he is obliged to conform to the written requisitions made on him by the officer of the gendarmerie, who remains responsible for the execution of his commands, when the auxiliary officer has conformed to his requisition.

Art. 298. When a mob takes on a character and growth such that the gendarmerie, after energetic intervention, find themselves powerless to stop their resistance by force of arms, it will draw up a verbal process in which it points out the ringleaders and abettors of the sedition; it will immediately notify the local authority, also the commander of the company or of the parish, in order to obtain reinforcements from neighboring brigades and, following the case, from troops of the line or national guard.

(Regulations from the service of places, of October 4, 1891.)

Art. 64. The commanders of guards, of pickets, and patrols ought not to lose sight of the conditions of responsibility in regard to the maintenance of public order, which Article 234 of the penal code imposes on them, thus: Every commander, every officer or under-officer who, after having been legally required by civil authority, shall have refused to make the force under his orders act, shall be punished by an imprisonment of from one to three months, without prejudice, for the civil reparations which may be due. The civil authorities who have the right to make requisitions are prefects, under-prefects, mayors, mayors' assistants, procureur-generals of court of appeals, procureurs of the republic, near tribunes and their substitutes, the presidents of courts or of tribunals, judges of instruction, justices of peace, and police commissioners. In urgent cases officers and under-officers of gendarmerie may require directly the assistance of the troops, who are obliged to obey their requisitions and to lend them assistance.

Requisitions may be made in writing set forth in such a manner as to put in evidence their motive and object and must be signed by the proper authority.

But in obeying the requisitions of the functionary charged with the execution of the laws and regulations of the police, the chiefs of posts remain free to adopt such military arrangements properly expressed as the object of the requisition appears to them to demand. The present article is in force in all corps of the guard.

Art. 65. If a chief of post is informed that disorders of a serious nature, caused by the military, or of which the military are the victims, have arisen in a wine house, a café, or any other public place, there will be sent on an under-officer or a corporal with the number of men necessary to arrest, if there is need, the disturbers or to protect the military who are threatened.

If these disorders take place in a house, the chief of post will send there a detachment. But he cannot enter without a requisition from the occupant, or without the assistance of a police commissioner.

Art. 71. In case of alarm the chiefs of post will hold their troops under arms. They will never allow a mob or assembly to form in the vicinity of a detachment of the guard. If these mobs persist, the chiefs will see if the symptoms are serious, they will cause the sentries to be alert, they will determine the circumstances in which they should fall back on the post, and make the troops charge in case of imminent peril. The commander of the forces, the police commissioner, and the neighboring posts are immediately warned, if communications permit it. In case of attack the commander of the guard will defend his post energetically by all the means in his power and to the last extremity, while conforming for this defense to the orders that the commmander of the troops has given for each post, in view of an outcome of this kind. These dispositions are made known, in conformity to Article 18, to the posts which ought to fall back on the others, and the posts which should be defended to the uttermost. In case of attack, the guards, patrols and pickets may not make use of their arms except in the circumstances and under the conditions foreseen by Article 169.

Art. 167. When the intervention of the troops is judged necessary to maintain the public order and to assure the execution of the laws, the military authority will act upon requisition, written by competent authority (see Art. 64) and, as far as possible, after having consulted with it. The motives and objects of the requisition should be clearly expressed.

The choice and the execution of the measures to take belong exclusively to the military authority whose responsibility in this matter is complete.

* * * * * *

Art. 169. In case of troubles outside of the circumstances specified by Art. 92, in which troops that are the object of an at-

tack should defend themselves by all possible means, they can make use of arms for the establishment of order only in the condition hereafter determined by the Law of June 7, 1848. When a mob is formed upon the public way, the mayor or assistant, or, in their absence, the police commissioner or other agent of the public force wearing the tricolored sash, goes to the place of the mob. A roll of the drum announces the arrival of the magistrate. If the mob is armed, the magistrate summons them to disperse and retire. If this first summons remains without effect, a second summons preceded by a roll of the drum or of a sound of a trumpet, is made by the magistrate. In case of resistance the mob is driven away by force. If the mob is unarmed the magistrate, after the first roll of the drum, exhorts the citizens to disperse. If they do not retire three summons are made in succession. If the mob resists it is driven away by force.

CONCLUSIONS.

The following conclusions are drawn from this survey of the regulations governing the employment of troops in civil disorders.

It is evident that one policy governs in Great Britain and the United States and another in Germany and France; one leaving the handling of mobs to the municipal police force, which, under stress, yields its authority to military force when the mob is in full swing and possession; the other assuming control under most carefully prepared laws, either in anticipation of danger or in its presence, is fully instructed to meet any condition of tumult. The people of France and Germany, having made the laws, know perfectly their scope and operation in every particular.

Quoting again from the introduction to Birkhimer's "Military Government and Martial Law," he asks: "Which of these two distinct policies is wiser; whether to permit martial law to spring forth the creature of accident, as generally has been the case in Great Britain and the United States, or whether it be the part of wisdom to accept the occasional happening of that imperious necessity, which alone justifies resort to martial law as an established fact, based on experience, and provide for its regulation by law is for the legislature to decide."

Enlightened statesmanship would seem to call for specific measures to meet the inevitable dangers of the future. The interests of humanity and economy, of capital and labor, of civic order and law call for wise provision by the National and State

legislatures to meet a condition of affairs liable to happen at any time in any part of our immense territory.

WHAT SHOULD BE THE PROVISIONS OF SUCH LEGISLATION?

First. A legal recognition and designation of a state of public danger, analogous to the state of siege in peace, as in Germany and France.

Second. A prescribed and definite system of public notification by proclamation of the condition of public danger.

Third. A prescribed and definite system of warning to rioters by the public press; by drum or trumpet or flag signals, or all three, which shall be peculiar to the condition of public danger and as well known to the public as the flag signals of the Weather Bureau. Such flags should be displayed from designated public buildings and in the hands of the troops in movement against mobs.

Fourth. Specific instructions to troops for such direction as may be ordinarily required under the conditions of tumult.

Fifth. Legal authority to close places where intoxicating liquor may be procured and to suspend business in whole or in part, as the crisis may require.

Sixth. Full responsibility to be imposed on all commanders for the propriety of their action.

Seventh. Such responsibility shall be to the military authority exclusively.

Eighth. No officer or soldier to be held answerable to any civil tribunal for any act done in the execution of his instructions or by way of duty, but shall be held primarily responsible to his military superiors and triable only by a legal military court.

Ninth. Absolute indemnity against criminal indictment or pecuniary damages for any act found by the Commander-in-chief of the troops engaged, either on the part of the United States or of the separate States, to have been justified by an existing condition of public danger.

NOTE.—The writer desires to express his obligation to the Military Information Division of the Adjutant-General's Office for the part of this paper relating to the State of Siege in Germany and France and to Mr. Theodore M. Leary for the translation of the "Instructions en Cas de Troubles, Paris, 1895."

Reprints and Translations.

NOTES ON AUSTRIAN FIELD ARTILLERY.

By Lieut.-Colonel DE C. DANIELL, R. A.

(*From Proceedings Royal Artillery Institution.*)

BEING at Görz last summer I was able, thanks to the courtesy of the Commandant of the Artillery, to visit the barracks. I found the officers most willing to show me over every part, and to afford me any information I wanted.

The artillery of the garrison consists of three field batteries, under a lieut.-colonel. In peace time only four guns and a small number of wagons are horsed per battery—the number of horses in each being 44. The remaining guns and all the ammunition are stored in the citadel, whilst the spare carriages are kept in a large gun-shed. These are stacked in two tiers, the upper one resting on planks laid along the wheels of the lower, thus greatly economizing space. In the story above is kept the spare harness, amounting to several hundred sets, each hung on one peg, except the collars which are stocked according to sizes. On mobilization the horses would be paraded below in batches, the harness thrown out of the large loft door, and the fitting would be carried out in a very short time.

The stables, one per battery, are long, well-ventilated buildings with a height at centre of arched roof of 18 feet. The windows with outside wooden shutters to exclude heat and glare. Down the centre is a passage 9 feet wide, slightly raised in the middle with a shallow drain on each side. The stalls are 10 feet long by 5½ wide, containing only a corn manger—the hay being placed on the ground; a far better plan than putting it up in racks. Both bails and posts are well protected by straw bands for about 3 feet.

The bedding is first formed by selecting trusses of strong straw 5 feet long—these are laid flush with the side drains, tightly packed down to a thickness of about a foot, and secured by a light batten across. On this permanent part, and on the stall beyond, some loose straw is scattered at night and removed in the morning. The permanent bedding is allowed to remain 3 or 4 months, except in cases of any horse contracting an infectious disease. When I visited the stables the bedding had only been laid for a few days—the stables smelt particularly sweet and were scrupulously clean, and I was told that even after it had been down for months there was no offensive smell. A great deal is due to the care taken—an orderly being told off night and day to catch the urine in a small bucket on the end of a 4-foot handle whenever the horses staled.

I have seen troop stables in America where the horses were stabled on

wood floors, slightly sloped to the rear, without litter of any sort with most satisfactory results as far as cleanliness.

The daily ration consists of—

Oats..... .....3½	kilos.=	7¾	lbs.
Straw..... .....1½	" =	3¼	"
Hay, wheelers.....4½	" =	10	" nearly.
" other horses...3½	" =	7¾	"

In winter the wheelers, and any other horses which carry heavy coats, are clipped and blanketted up.

The harness struck one as being particulaaly light and simple, at the same time very serviceable.

The traces of flat leather, 1½ inches wide with some 3 feet of twisted rope at the far end, are secured in front to a large staple on the hames by a triangular D, one side of which consists of a movable pin secured by a tie. To the rope end, in the case of leaders, is attached a rope trace, which passes through a suspending loop on the centre horse's fittings, fastens to one of the pole swingle-trees—thus each horse has a direct pull on the carriage. The traces of the centre horses are similarly attached. The wither strap of the off horse is fastened to a leather strap 1½ inches wide, which rests along the horse's back, sufficiently far to support the traces and hip straps—there being no crupper. Belly-bands are of leather. The harness of the wheelers is similar, except that there is in addition a light breeching, which is attached on each side to the trace, about half way up, and suspended from the back strap.

The pole strap is attached to a broad leather strap, which goes across the front of the collars, fastened at either end to the same D as the traces.

The pole is about 15 feet long—the method of coupling throughout consists of a ring on one part and a pin on a chain on the other, the pin being put through the ring from above.

The riding horses have a bit rein and the off horses a bridoon leading rein and side rein. The stirrups have flat bars. A folded blanket is carried under the saddle, which is roomy and well padded, with a flap about 3 inches projecting round the soft seat. The cloak and mess-tin are carried in rear, and in front are 2 saddle-bags containing change of linen, stable head-collar and cleaning traps. The leather is blackened, also the hames —the remainder of the iron work, of which there is little, being kept bright.

The guns are of bronze, 9 centimetres (slightly over 3.5 inches). Three gunners ride on the limber, two on the axletree seats. The axletree and limber seats are well padded and have a broad supporting strap—that on the limber is a foot from the rear, along which runs a net some 18 inches high, between it and the strap the men's great-coats are stowed, their kits being carried on the wagon. There is a tire brake worked by a wheel in front. The handspike is always carried shipped; the pin-tail being on a semicircular iron band projecting two feet behind the limber on which the back flap rests when laid down. The shells are carried on wooden boxes which pull out. On the foot-board is a box for spare traces and similar stores.

Thirty-four rounds are carried per gun and 94 per wagon.

The gun and limber packed (with five men) weighs 1910 kilos. (39¼ cwt.), the wagon (with three) 2202 kilos. (45 cwt.), six horses to guns and wagons and a mounted N.-C.O. to each two guns.

The barrack-rooms are airy and very clean and tidy. The bedsteads consist of light iron frames and wood-bottom boards—good thick palliasses and white sheets and blankets.

Both gunners and drivers wear breeches and boots, the latter being very well made and light.

The mounted N.-C.O.'s have cavalry swords and revolvers, all others a short straight sword—a few rifles are carried for escort or guard duty.

The officers wear dark-brown cord breeches, black boots, a plain blue tunic not unlike our own—the only ornamentation being red cuffs, a red patch on either side of the collar on which are the badges of rank, viz.: one, two or three small gold stars, a thin gold shoulder cord on the left side only, gold laced belts and slings and a peaked cap laced according to rank. The general effect is very neat and smart, and far more inexpensive than with us—a tunic only costing £3!

The horses, as a rule, were lower and lighter than our own, but showed little signs of the hard work they had lately done, for the batteries had just returned from two months' manœuvres over a very rough country during the hottest time in the year, still there were no signs of galls of any sort; this is probably due to a certain extent to the excellent system of harnessing which, by-the-bye, has been selected by the Shah of Persia as a pattern for his own—that it is very light and still most durable there seems to be no doubt, and it is naturally well fitted for hot climates.

The men were sturdy and well built and seemed cheerful and willing—drawn as they are from various districts, often speaking only their own dialects (six or seven in a battery), the officers have to do a great deal through the better educated N.-C.O.'s.

Service in the artillery is very popular and both officers and men are proud of the arm to which they belong.

The officers are good riders and good whips—both of which accomplishments they acquire under most favorable conditions on first joining, as horses, hounds and brakes are kept up for this purpose by government at the school of instruction for the mounted branches.

SWORD AND PISTOL *

(From the United Service Gazette.)

BY COLONEL M. J. KING-HARMAN.

THAT distinguished officer, the late General Sir George Chesney, once gave this piece of advice to the students at Cooper's Hill College, that each one of them on joining the service should adopt some hobby apart from his profession as a relaxation, and a very valuable piece of advice it is too.

In order to be an efficient combatant, it is necessary that an officer

* Abridged from the article in the *Journal* of the United Service Institution of India.

should be a complete master of the weapons with which he is armed. Examinations in various subjects which appear to be increasing in number steadily are considered to be necessary for the production of good officers, but as yet no examination in swordsmanship or pistol shooting has been considered necessary. The reason for this I cannot guess, but I am in great hopes that in course of time one will be instituted for all young officers before they are gazetted as lieutenants in any branch of the service. We insist on a certain standard of excellence in the use of arms being attained by all private soldiers, but we attach no importance to the fighting capabilities of the officers who have to lead those soldiers. There seems to me to be something unreasonable in that. Every weapon with which an officer or a soldier is armed should be the very best of its kind that can be produced.

Starting from those two as my base, I will now endeavor to place before the readers of this journal the results of my experiences during the past three years, and the conclusions that I have drawn from them. The sword being in my opinion the most important of the two weapons, I will commence with it. If I was asked my reasons for that preference I should feel inclined to answer, in the words of that famous old Irish song,

> "The pistol flashed,
> His head I smashed;
> Och! Shillelagh never missed fire."

Any pistol may happen to misfire, and if that occurs when your adversary is five yards off you will be in an awkward position, unless you have a trusty sword in your right hand, and know how to use it.

Few people have any idea of the number of different patterns of swords that have been introduced into the service at various times, and we shall not gain much by going into that question at any length now; but, as illustrating the ideas that have prevailed, it may interest some of you to know that prior to November, 1888, there were in the service five separate patterns for dismounted staff sergeants. It must be remembered that the infantry staff sergeant's sword was similar in construction to the swords worn by officers; but it was not the only weapon which government supplied to those men: they were also armed with a pistol each, and so had the advantage over the officers, who up to 1888 were not, I think, obliged to have pistols as part of their equipment.

Possibly there are many who have never heard how it came about that those five patterns were reduced to one pattern blade and two patterns of hilts—one gilt and one steel—and I did not know the full particulars myself until within the last three years. It happened in this way. When the old 65th York and Lancaster Regiment returned to England from the Soudan, the officer who had to report on the arms reported the swords of the staff sergeants to be useless as weapons of offense and of very little use for defensive purposes, and added in all seriousness some remarkable words, to the effect that, as the staff sergeants were armed with pistols, possibly the uselessness of their swords was not of much consequence. It was probable that the stinging, though unintended sarcasm contained in the last remark brought matters to a head, as it was not long before the pattern was changed, and a better class of sword was issued. That is to

say, it was in less than five years. It must be remembered that at that time there was considerable, but only temporary popular indignation over the extremely inconvenient revelations concerning twisted bayonets and broken cavalry swords in the Soudan and Egypt.

The years 1887-89 were busy ones for all interested in swords, for during those years, in addition to the staff sergeants' swords, very important changes were made in the cutlasses and sword-bayonet cutlasses issued to the Royal Navy; and attempts were also made to provide a really good sword for the Household Cavalry. It was during the discussion which took place regarding the latter that one of the high responsible officials made great efforts to settle the important question whether the sword should be a cutting or a thrusting one. He demonstrated clearly that they were two absolutely different weapons, and that conditions of balance, weight, handle, and quality of material rendered it impossible for a sword to be made equally good for both purposes. It is a great pity that our national love for compromises leads us to ignore that most important point. It may appear strange, but it is nevertheless true, that those are identical opinions held and expressed by professional sword-makers. They say that if government will once decide which description of sword is to be used, they will find no difficulty in obtaining the best possible article from the trade in England; but that none of them will insure the success of a hybrid.

Strange to say, during all that time no notice was taken of the infantry officer's sword. Most of the discussions and experiments turned on the bending tests of the blades; and the result was curious. The sealed pattern staff sergeant's sword resisted a vertical pressure of 33 lbs. before deviating from a straight line. The new naval cutlass resisted not less than 70 lbs.; and the Household Cavalry sword (pattern 1888) resisted 28 lbs. No reason was given, or can be given for such differences. But what I want to know is why a sword which is required to be thrust through the body of a heavily clothed man should be pliable. If it bends it will not go through; and if it does not penetrate the force of impact is too small to cause injury to the body thrust at. We do not make our lances or bayonets pliable; there certainly is an official bending test for the triangular bayonet, but it is resistance to a weight of 440 lbs., which almost amounts to rigidity.

An extremely interesting and valuable report on the best tests to be applied to and the best material to be used in making swords was submitted to the War Office by Sir F. Bramwell and Mr. B. Baker in August, 1889, but it is too long and too full of technicalities to reproduce here. My own opinion is that we shall never arrive at finality in this matter until we adopt a rigid blade; the proper shape of the blade will very soon be found directly the question of cut or thrust is decided, and the length and shape of handle, which is of equal if not greater importance, will follow on that.

The more rigid a blade is, the more effective must it be for thrusting; and rigidity does not in any way detract from cutting power—witness the old Damascus scimitars or a good Indian tulwar. Colonel G. M. Fox, a noted swordsman and inspector of gymnasia in Great Britain is strongly in favor of a straight pointing sword; and he makes no secret of his con-

viction that the present cavalry sword is far too heavy even for our Heavy Dragoons. The sword controls the man instead of the man controlling the sword. Any of you can prove that yourselves by half an hour's actual trial, and it was also clearly demonstrated by the colonel of a famous cavalry regiment in his lecture at the Royal United Service Institution on "Cavalry Equipment." This opinion was arrived at long ago by those eminently practical gentlemen Messrs. Latham and Musgrave, of the Wilkinson Sword Company, who exhibit in their show-room a sword of their own design and make which, I think, embodies Colonel Fox's views, but which is of a peculiar form and very light, which they strongly recommend for cavalry. It is strong enough to resist any number of blows or to parry a bayonet thrust; it is rigid enough to be thrust through anything; and it has no edge, therefore there is no inducement for a man to attempt to cut or beat with it. Such a sword only requires to be held straight and thrust forward with as much force as possible; therefore our officers and men could be easily taught the use of it, and a charge by a regiment so armed would possibly prove more effective than a charge of Lancers. I believe that no one doubts the superiority of the point of western nations over the eastern cut.

At one time I advocated the use of either a purely cutting sword or a purely thrusting one, but I am now convinced that the former would never answer in the hands of English troopers; if, however, the latter form was adopted, what would become of our beautiful but perfectly useless sword exercise and pursuing practice? As illustrating the utter inability of the average trooper to use the edge of his regulation sword, I may mention a curious incident that occurred at the Regent's Park barracks in the year 1885, and which only came to my notice at a comparatively recent date, when six trained mounted men of the Life Guards were had out before a special committee to show how deeply they could cut with sharpened regulation swords into the body of a dead horse, but none of them could cut with the edge leading, and all of them hit with more or less of the flat side of the sword.

There are some distinguished men who are still in favor of having an edge to pointing swords, and their argument is that in a close *mêlée*, where opposing forces are mixed up closely together, the men may be so jammed up as to be unable to use the point effectively and that the cut will then be of the greatest use. I have never been in such a position myself, but my idea is that if a man is so tight wedged in by others as to be unable to drive his point with one motion into something—man or horse in front of him or to one side—he certainly will be equally unable to raise his hand sufficiently to deliver a blow which requires two separate movements, and which also requires a certain amount of space in order to make the blow tell; and further, I am sure that the chances are all against that blow being with the true edge. With a short, curved weapon in the hands of an expert it might be just possible, but not otherwise. I attach no importance to the argument that if a man thrusts his sword into a body he will have great difficulty in drawing it out again, and that, meanwhile, he will be defenseless; that may be or it may not be, and, anyhow, the man has done for

somebody. But I do attach importance to the fact that an uplifted arm means an undefended body, and that a blow with the side of a sword generally means a broken weapon.

The new sword for infantry officers which was introduced about three years ago is an improvement on its predecessors, but it is still a compromise. It was intended to be chiefly a thrusting sword, but it is not sufficiently rigid to be accepted as such, and the handle is neither long enough nor properly shaped for that purpose; added to which the blade is edged for the purpose of being used for cutting, but it is too narrow and light to carry through an effective cut, therefore it is neither one thing nor the other, although probably intended to be both. With a properly shaped handle it would make a good duelling sword, but it is not an efficient fighting weapon for active service.

It will be welcome news to many to hear that, at last, the pretty gilt guard has been officially condemned, and a steel one has been sanctioned instead; but no other change appears to be contemplated just at present, which is a great pity, the more so because the sword cutlers themselves are very open in pointing out the defects and in demonstrating how they can be remedied; and, moreover, the requisite changes will entail no expense on government because the officers pay for their own swords.

I hope some day to see the large elaborate guard done away with, because it cramps the free action of the hand and wrist, and is most inconvenient when the sword is worn in a service belt, or even when it is hooked up in peace time. I own that it looks very well, and I know that for that reason alone few would like to give it up, but a plain cross-hilt would look nearly as well, and would be far more comfortable. As for being a defense for the hand, well, I think that is only an excuse for a bad swordsman; but for a man who can use his sword ever so little, I am sure that his best defense lies in his blade, and you may be sure that if a man can cut your hand, he can with equal ease cut your head, which will answer his purpose much better. I will not waste time and space in attempting to describe the number of different kinds of swords that I examined when at home last winter, but if anyone has a taste in that direction, I should advise him to pay a visit to the armory in the Tower of London, which contains an incomplete though a fairly good collection of duelling and fighting swords; and a careful examination of them will surely set any man thinking how or why it is that we as a nation appear to be so ignorant about swords.

Having given so much space to the sword, I must now pass on to the use of it. I should like to know how many officers in India have learnt the use of the sword practically during the past three years. There cannot be many, and I fear that there are very few. There appear to be two reasons for that; one is the lamentable want of instructors, and the other is the want of inclination on the part of the officers. This may raise a smile, but it is a fact. At how many stations in India or elsewhere are there voluntary fencing classes, and how many officers attend those classes? The lack of instructors can only be got over by sending men home to be trained; but meanwhile a great deal more can easily be learnt from the few who are in this country than is now done; and very much can be accomplished by self-

instruction. I know of one distinguished regiment, the officers of which took the matter into their own hands a few years ago, and deliberately taught themselves fencing and also revolver shooting, so it is plain that where there is a will there is always a way. Of course, if men are individually so apathetic that they will not voluntarily learn the use of their weapons, the only other way of teaching them is by compulsion; and I hope that even that unpopular course will be adopted rather than that the mass of our officers should be left much longer in such ignorance as they are at present. Every officer should take a pride in his knowledge of his own weapons, and such knowledge will give him complete self-confidence wherever he goes.

I am well aware what the duties of an officer are towards his men, both in peace and in war, so I need not be reminded of them; and I am very far from being an advocate of an officer neglecting those duties in an endeavor to secure fame through a series of independent personal encounters; yet that is one of the sins that is laid at my door. I am also thoroughly sick of the oft-repeated but groundless statement that nowadays officers have so much to do as not to have time to devote to a short practise occasionally in fencing or shooting. It would of course be a disgrace to our army if such were true, but fortunately it is not so. We have already in the regular and auxiliary forces of the empire some of the finest swordsmen in the world, and there appears no sufficient reason why every officer should not be an expert swordsman.

I notice that those who object most strongly to officers being combatants belong entirely to the party that contains in its ranks many who will doubtless soon be urging the necessity for having a final and searching examination for general officers previous to death, they themselves being, as usual, alone excepted. Be it known unto them that expertness in swordsmanship is not incompatible with a complete knowledge of tactics, and that in all probability the best tactician will prove to be the ablest swordsman.

It may seem strange that in order to get really good instructors it will be necessary to send men home to be trained; but so it is, and I had it from the chief inspector himself that he has not one single available man whom he could send out to this country; but so keen is he about the training of our officers and men that he will be only too glad to receive and to give special instruction to any number of selected non-commissioned officers or men who may be sent to him from India for that purpose. In his opinion, such men should undergo one year's continued instruction in order to make them thoroughly efficient. It is fortunate for the army that we have such a competent enthusiast at the head of the gymnastic establishment; but so far the infection of his enthusiasm has not caught on to many others, which is much to be regretted.

Independently of the acknowledged fact that a combatant officer ought to be able to fight, it appears incomprehensible that officers do not study, for the sake of recreation and exercise, the beautiful art of fencing, which is the most thorough and complete, as it is also the most intellectual of all physical exercise. It seems unfair, though, to throw all or even much of

the blame on our young officers, because they have these good excuses—namely, that they were not taught fencing or indeed any kind of fighting when they were at school; that the instruction given them on joining the army, which has heretofore been very seldom given at all, was of too perfunctory a nature and of too short duration to do them any good, or even to excite their interest in the matter at all; and that no encouragement whatever has been given to them since. I think that you will all agree that those are very valid reasons.

I may also tell you that the small amount of instruction which is imparted at Sandhurst is almost useless; and so I have now come to the conclusion, which has also been arrived at by others, that the original sinners in respect to this apparent apathy amongst our junior officers are their parents and their schoolmasters. I was confirmed in that opinion by reading a most interesting paper contributed to the *Journal* of the Royal United Service Institution in September last year, by that well-known author and accomplished swordsman, Captain A. Hutton, and by a visit which I paid in his company to Bradfield College, Berkshire, last December, where I witnessed a most interesting and highly creditable display of modern fencing, old sword play and gymnastics, under the direct personal supervision of the head-master and two of the assistant-masters, in which a large number of the boys of all ages took part, in the school gymnasium. The proficiency and enthusiasm exhibited by all, especially those engaged in the final bouts, was a complete revelation to me. No other school studies or games were neglected for the gymnasium; and the physique, appearance, and good behavior of all the boys was quite remarkable. There is very strict discipline at the school. My only regret was that so few of them appeared to be destined to be soldiers. What has been so successfully achieved at Bradfield can be just as easily and as well done at all other schools; and I earnestly hope that other principals will lose no time in following the good example set them in teaching our embryo officers the use of their weapons and in enforcing stricter discipline than generally exists at present.

Fencing is an art which should be commenced young, and it will be found so attractive and alluring that in the future as in the past it will never be forgotten and seldom dropped. At the same time there is nothing so difficult about it that it cannot be taken up and worked with success by men of almost any age. It is, unfortunately, the fashion amongst many people to say that a knowledge of swordsmanship is no longer of any use because the days of hand-to-hand fighting have long since passed away. But even if that were true as regards European warfare, of which I am not so certain, yet proficiency in the use of arms can never be considered as derogatory to the position of an English officer; and, situated as we are with the constant liability to be engaged in fights with warlike tribes in Asia, Africa, and elsewhere, where hand-to-hand fighting with born swordsmen will ever be, as it has been hitherto, the rule, it is absolutely essential that each one of our combatant officers should be a competent master of his weapons; and, moreover, no one can deny that in the past many a fine British officer could and would have saved his own life as well as the lives

of others, and so continue to lead on his men to victory, if he had only been armed with good weapons and had known how to use them.

Through the kindness of Colonel Russell, commanding the Inns of Court Rifle Volunteers, I was permitted to visit the fine gymnasium belonging to that corps, and saw some very fine fencing with foils and with sabres by several of the members. In that school they have the advantage of the services of Sergeant-Major Blackburne, late of the Life Guards, who is supposed to be one of the best instructors in London ; and the keenest interest is taken by all ranks in fencing generally. I was unfortunately unable to avail myself of many kind invitations to visit the school of the London Rifle Brigade, which corps possesses a large number of well-known fencers, including those belonging to the Cadet company from King's College School, who ably assisted at the fine exhibition of swordsmanship which was given at Toynbee Hall after the lecture by Lieut. Stenson-Cooke, last January. But the most important gymnasium in London is that belonging to the London Fencing Club at No. 7 Cleveland Row, St. James', to which I had the honor of being admitted as a visiting member. This club consists of some 300 members, and is under the direction of a committee with Mr. W. E. Hartopp as secretary. There are two French *maîtres d'armes* as fencing instructors, and a special gymnastic instructor, and nothing is wanting to make the club the most convenient place of the sort that can be seen anywhere. The election is by ballot, with an annual subscription and a small entrance donation. Some of the best men in London, including Captain Alfred Hutton, may be seen fencing there any afternoon, and a great many officers of the Household Cavalry and Brigade of Guards are active members of the club.

The place that attracted me most of all was the magnificent central gymnasium at Aldershot ; and, thanks to the courtesy of the presiding genius, Colonel G. M. Fox, I was able to pay two long and most interesting visits to that centre of gymnastic and fencing instruction for the British army. I can imagine nothing more perfect than the system of instruction for non-commissioned officers and soldiers which is carried on there ; but the time allowed for the instruction of the recruit officers is not half long enough. The material to be worked on is not always very promising ; in fact, I saw young officers there who could not possibly have been properly turned out under six months, and then they would have still required a further term of six months before they could have passed muster as fencers. However, that is not the fault of the inspector, who would gladly work them into shape if he was given time ; but it is the fault of the original bringing up and school life—I cannot call it training—of those young gentlemen who enter the service of her Majesty with the object of leading her troops in battle, and yet who in too many instances are utterly unable to take care of themselves. I say that a very serious responsibility rests with parents and masters who are bringing up our boys in such needless luxury as they enjoy nowadays and in sending them out into the world inferior in physique sometimes to their own sisters, unused to discipline, and unable to undergo hard work and exposure without falling sick.

I consider that the custom which has been adopted at most of our schools of giving each boy a room to himself is most harmful in every way;

boys are molly-coddled nowadays to such an extent that many of them have no chance of growing up into hardy, independent, vigorous men. I should like to see the whole of the interior economy of our boys' schools altered back to what it used to be even twenty years ago; we should not then have to complain that the women were bigger than the men, as they often are now, or to mourn the death of so many young men from the dreaded so-called typhoid fever. I only hope that before long this may be taken up as a national question and thoroughly worked out; it may then be found that want of stamina has more to say to typhoid than milk or water or anything else.

To quote the works of one of the best writers on physical training—"A Natural Method of Physical Training," by Edwin Checkley: "The trouble is, that so many of our latter-day health codes are framed by men who mistake the exigencies of their own decrepitude for the normal condition of mankind." Often our boys are not allowed to go out of doors in cold weather without a warm comforter of some sort round their necks, and a great coat on their backs; consequently the first time they are exposed to any unusual hardship, down they go. Our girls, with their scanty clothing, when young, and their totally different school treatment, grow up much hardier, and more enduring than the boys. That used not to be the case thirty or even twenty years ago, and it ought not to be allowed to continue any longer.

My chief object in visiting Aldershot was to thoroughly understand the new system of fencing which is being now taught there and which has attracted considerable attention throughout England. It is known generally as the Italian system, but in reality it is not the Italian system, but a radical departure from it, and is, to be accurate, the Florentine system, which was originally invented by Radielli in the middle of the present century, and was brought to its final stage of perfection by that great master, Masiello of Florence, whose wonderful performances at the Grand Military Tournament may have been witnessed by some of you.

To make a long story short, Colonel Fox decided from personal experience that this Florentine system was the best in existence, and, acting on his advice, it has been officially adopted for the British army; but no orders have been issued that all officers are to qualify in it. Whether or not it is the best system for adoption I am not prepared to say; but this I can say, that it differs in all essential respects from the French system, which is adopted everywhere out of Italy, and that it has been rejected by all the clubs and schools in London that I know of. It does not follow from this that the system is faulty, because we are a conservative people in many ways and do not take readily to new ways; but the fact is that during the past five or six years there has been a great and general revival of fencing in London, which is gradually extending to the counties, and many medical men have now recognized the extreme value of that form of exercise, and are ordering it for their patients amongst overworked professional men and hypochondriacs. People are very much in earnest about fencing, the schools are full of pupils, and there are constant open competitions at the German club, at Chiosso's and other gymnasiums, which has produced a friendly rivalry amongst the instructors, who, of course, try in every legitimate way to turn out winners from amongst their pupils, and to outdo each other;

and thus it has happened that this Florentine system appears to have received full and impartial trial by all, and to have been rejected as being in no way superior to the French system, and as being not considered quite suitable for Englishmen.

Further, owing to the enormously increased exertion and strain on the whole body which is indispensable to the attainment of anything approaching proficiency in the new system, the doctors have been examining it from a medical point of view, and from what I have heard I think it probable that they will pronounce against it, especially for boys. Anyone wishing to study the new system should do so at Aldershot, where he will see it worked to perfection by that grand swordsman and athlete, Sergeant-Major Palmer, and his two chief assistants.

The new book of instruction in the use of the sword, which deals most exhaustively with the subject, does not touch on the use of the foil, from which it will naturally be inferred that the foil is to be discontinued as a weapon of instruction in our army, and that, if true, will possibly arouse the opposition of the nation. A careful study of the book and its excellent illustrations will, perhaps convey to some, as it does to me, the impression that this system is one of aggressive force in attack, combined with great power of defense, against the edge, but that it lacks entirely the graceful vigor, the refinement and suppleness of the art as practised in France and elsewhere. I may observe that the instruction sword referred to in the book differs in many important respects from the regulation sword, and that many movements which are possible with the one are almost impossible with the other.

It is highly desirable that we should have one established system for all England, and now is the time to take advantage of the enthusiasm which prevails to settle definitely which it should be. It is distinctly undesirable that two separate and opposite systems should prevail. Colonel Fox is the great champion of the Florentine system and Captain Hutton is one of the most experienced exponents of the French; both of them have done wonders in encouraging the study of swordsmanship in England; and I believe that between them a way could easily be found to settle this important question. But who will take the first step? That is where the difficulty lies. I hope, however, that some one in authority will step in and take the matter up and have it definitely settled in the most public manner possible, either at or before the next tournament. Both sides are quite confident of being able to prove their respective cases, and both know how desirable it is to have the matter settled one way or the other. A healthy rivalry is a good thing, but acrimonious letter-writing in the public press is unseemly and leads to no good. The following illustrations will show you the difference between the two systems so far as regards the position of the fencer when "on guard" and when on the "lunge." Three great points of difference will be at once observed—namely, the width of base, the position of the right arm, and the attitude of the body.

In the French system, the distance between the feet when "on guard" is laid down as twice the length of the foot as near as may be, but in the Florentine system it is two and a half foot lengths; and it is this extra

compulsory distance which is found to cause a great strain on the muscles in the region of the pelvis so much condemned by doctors. Instructions in the French system insist on the body being kept well braced up and the head erect when extended on the lunge, in order that a proper balance may be maintained and the recovery to the position of guard be facilitated; whilst the Florentine instructions contend that those two important points—*i. e.*, correct balance and quick recovery—as well as extended reach, are gained by starting from a wide base and throwing the body and head as much forward as possible. Both cannot be right, and the right way only should be adopted, whichever it is.

Again, the French work with a supple wrist and fingers, commencing from a bent arm and a free, unconstrained position of body, the hand and eye working together under the guidance of the brain; whereas the exponents of the Florentine school work with a tight, claw-like grip and a stiff wrist, commencing from a rigid straight arm, the chief work of parry and thrust being done by the elbow and shoulder, on the principle that those parts being nearer the brain than the wrist, their action must, therefore, be quicker and more correct than that performed by wrist and finger action. They may be right in this point also, but if they are, all I can say is that they should be called on to prove it by actual trial before their views are accepted; and I hope that before long some means will be found of proving clearly, not only which system is right, but also which is most suitable for us.

After reading so far, the first question that I will naturally be asked by most people is this, What is thought of this new system in Italy, the land of its birth? Well, all I can say is that I made careful inquiries on that point when I was in Italy lately, and I found that the system now being adopted by us at home is considered inferior to that of the Roman school, and is not adopted, I believe, in the Italian army or navy. The Roman system differs very slightly from that of France, and it must be remembered that in Italy, as in other continental countries, the army and navy represent the nation, whereas in England they certainly do not. Signor Parizi was sent over to one of our grand military tournaments in London as an exponent of the Italian system of fencing.

I will now pass on to revolvers. Three years ago the present regulation revolver was ready for issue, but the ammunition for it was not ready. Since then the ammunition has been supplied and the revolver has had a very fair trial. The pistol is undoubtedly a great improvement on the obsolete Enfield revolver, but it is still far behind many others that are obtainable in the market, and cannot compare in any way with either the Colt .45, or with the Smith and Wesson of the Russian army, .44 calibre. However, both the pistol and the ammunition were made according to government specifications, therefore no blame attaches to the makers. Had Messrs. Webley & Co. or any other good professional pistol-maker in England been given *carte blanche* and told to produce the most accurate and strongest man-killing revolver in the world, they would probably have been able to do so. But they were not told that, and we know the result.

The Wilkinson Sword Company are now at work on a revolver which,

from what I have seen of it, promises to be a formidable rival to all the best existing patterns; but, even if they are successful, we shall still want a reliable man-killing cartridge, with a propelling charge which will drop any man within a range of 25 or 30 yards. That same enterprising firm has just opened an underground revolver range at No. 19 Swallow Street, Piccadilly, where for a trifling cost any one can try any revolver that he likes before purchasing it. It is the only place of the kind that I know of in London. I tried two revolvers there myself, using cartridges filled with the new S. V. smokeless powder, which are sold by Eley Bros. For accurate match shooting, there is probably nothing that comes up to Colt's new single-action revolver which has just come out.

Until quite recently, the prevailing opinion regarding the manner in which the revolver should be used on service was that it should be employed first, commencing at about 25 yards distance, and that the sword should be kept ready in the right hand for use at close quarters; but with the present regulation short-barrelled weapon it is now considered by many good authorities that the revolver should be retained in the left hand, loaded and ready to support the sword in case of failure to make good the first thrust, or in case of having to encounter two or more antagonists at the same time. There are no doubt many who have known or heard of instances in which officers have missed six shots in succession at men coming at them, and then having failed to make good their thrust or cut, or having broken their sword, have been quite at the mercy of any assailant until some one came to their assistance. Of course in a fight the chief requisite is a cool head, and if that is backed up by good weapons, and a good knowledge of their use, the result, humanly speaking, can never be in doubt.

During the past three years great attention has been paid to the use of the revolver, and a most extraordinary improvement in revolver shooting has taken place; but we still want a reliable man-killing weapon that will not jam or stick in continuous firing, and I hope that we shall soon get one. The weightiest evidence against the present pattern of army revolver lies in the fact that few officers will purchase one when they can get any other.

THE INTERIOR ECONOMY OF THE ARMIES OF NAPOLEON.

By Major E. S. MAY, R. A.

(From the United Service Magazine, London)

PUBLIC attention has recently been much directed to all questions affecting the well-being and efficiency of the soldier. The spread of the volunteer movement has made many civilians learned in military questions, and every second man you meet has his own ideas as regards discipline and administration, and is prepared to bring forward arguments in support of his views. The recent letters on "Army Reform" form a striking example of how many think on such subjects, and how various are the conclusions they arrive at. *Tot homines, quot sententiæ.* It

is not now proposed to wander into this maze of controversy; it is enough for us to point out that the mere fact of its having been kept so prominently before the public argues a strong and general desire to probe the sources of military efficiency, and go to the root of the causes that make a fighting machine formidable. Everyone admits that more than a mere question of pay or tactics is involved. Courage in the men and intelligence amongst the officers can be legislated for by no act of parliament, nor will the most judiciously-composed manual insure their presence.

Human nature is in every age the same, and has at all times shown itself highly susceptible to influences outside mere professional requirements, and capable of vast and unexpected efforts in response to an opportune appeal to its moral instincts. Such influences must be invoked, and the call must be genially responded to if the utmost is to be got out of the soldier, and, therefore, to utilize some such motive force has ever been the study and aim of great leaders of men. Sometimes a mysterious personal magnetism has been sufficient. The glamour of Napoleon's name was equal to 40,000 men on the field of battle, according to the estimate of his greatest opponent, while readers of Sir John Kincaid will remember the confidence that rival inspired on his side too, and how "his long nose was worth 10,000 men to us any day in the fight." Oftener, perhaps, religious feeling or fanaticism has underlain and given a basis to military discipline and success. We have lately been told by Lord Wolseley that Cromwell's army was perhaps the most efficient one of modern times, and no doubt it does supply a singular example of how self-respect and a stern sense of duty will turn the scale where race and courage and physique are on both sides equal. The bravery and self-sacrifice displayed in all ages by the followers of the prophet is likewise the direct outcome of religious fervor, though of a lower type. Here the appeal is to baser instincts, and offers sensual in place of spiritual rewards; yet it has ever acquired an influence over its followers which a purer faith has striven for in vain, because its promises are more readily understood and appreciated by the natures to which it is addressed. Similarly, motives lower still in human nature can sometimes be made to incite to brave and chivalrous deeds of arms.

Patriotism walks hand-in-hand with religion, and frequently but reiterates her call; yet the lust of conquest, avarice, vanity, the spirit of the gambler, sordid incentives, as they sound, have often nerved men to splendid efforts and magnificent success. A clever piece of timely flattery or the jingle of prize-money will rouse some minds that would be deaf to other calls. Nevertheless, the baser passions, if they can more easily be excited, may readily become a source of weakness rather than of strength, and are at best but an uncertain element to reckon with.

Napoleon well understood human nature, and perhaps succeeded to a greater degree than any other leader in gaining the confidence and affection of those he led. His system exhibits, however, the defects as well as the advantages which must ever accrue to one resting on no secure moral basis, and for this reason is especially interesting. A German pamphlet has lately drawn attention to what life in his army was like, and from it much of the information in the following pages has been drawn.

The French army of his day might be entered in a variety of ways. As a volunteer, as a conscript, as a volunteer for the Imperial Guard, or as a student from the military school of Fontainebleau. The first two methods demanded only certain physical qualifications, which, however, in the case of conscripts, especially in the latter days of the empire, were not very strictly insisted on. Volunteers for the Guard, on the other hand, in addition to physical fitness, had to show that they were possessed of a private income of 300 francs ere they might enter the cavalry, and of 200 francs before they could join the infantry of that distinguished corps. They had also to display some educational proficiency, and might hope to become commissioned officers in about four years.

There was considerable competition thus to enter the Guard, not only to escape the conscription, but also because there existed a genuine military enthusiasm amongst the youth of France at that time, and usually no difficulty was experienced in getting volunteers.

The military school of Fontainebleau formed the chief nursery for young officers for the army, and could accommodate as many as 600 cadets, who received their commissions when about eighteen years of age. It is said that the Emperor was very careful what officers were selected for duty at this establishment, and would only appoint such as were particularly well qualified and suitable. The course of study there embraced instruction in history, geography, mathematics, fortification, topography, and freehand drawing, and four hours were devoted to drill every day. Discipline was severe and exacting, even the reading of novels was forbidden, and cadets were recommended to study the drill regulations in their spare moments, if indeed they found they had any. The food was simple but sufficient, and good of its kind, and was issued under much the same regulations as were observed in the soldiers' barrack-rooms. The cost of maintaining a boy there was about 1200 francs a year, which was then looked upon as a heavy sum, but which did not deter the young men of France from eagerly coming forward as candidates. Such magic was there in a showy uniform, the brightness of the victories in the wars that followed the Revolution, the prestige of Napoleon's name, and the alluring visions conjured up by his tempting phrase about the bâton that might be stowed away in the knapsack of the meanest soldier. It is to those words that the motives which animated the French soldiers of those times may chiefly be attributed. The spirit of the gambler was abroad. The old order had been changed and was gone for ever with the old ideas and the old watchwords. Their leader no longer appealed to their love of country, no longer rallied them to defend their hearths and homes, but called them to wars of aggrandizement and annexation where booty and plunder might be looked for. His own career and that of his generals through the stormy scenes of the Revolution was the best example of what might be in store for a man with intellect and energy, and with such striking instances ever before them, every officer, non-commissioned, and private in that army, could hope that some day the fortune of war might bring him to the top, and allow him to reach similar heights of wealth or greatness.

Sensuality and luxury were by no means strangers to those either high

or low in rank. Marshals and generals, it is to be feared, set but a bad example to their subordinates. They grew rich at the expense of the inhabitants of the lands they occupied, and were paid often heavy sums for issuing orders against plundering (which, by the way, were usually disregarded), or for exempting towns from requisitions or occupation. They kept open house, were surrounded by a large retinue, which included captains, subalterns, footmen, grooms, etc.; and their servants were dressed in uniforms similar to those of their aide-de-camps, with the exception that they had no epaulets. So soon do we find aristocratic ceremony superseding republican simplicity! In the lower ranks, as was to be expected, the same tendency towards waste and extravagance displayed itself. Pay was often insufficient, and sometimes not forthcoming. The commissariat arrangements were frequently defective, and men had to live as best they could from hand to mouth. "The war was to support the war," as Napoleon said, or, in other words, men must shift for themselves. When one considers the effect of the example set them by their superiors, and that plundering was winked at, if not authorized, one need hardly feel surprise that the men tried to compensate themselves for previous hunger and privations, by making the most of any opportunities that occurred, and that the population of the country they passed through suffered accordingly.

The soldiers of Napoleon's army were so well looked after as regards pay and comforts that there was usually little cause on these grounds for excesses. We find that under ordinary circumstances the pay of the private was 52 centimes a day, which, making allowance for the lower value of money in our time, may be looked on as something like what a shilling a day is now. His men, therefore, were as well paid as is our volunteer army of the present day, and they also received a free bread ration and a supply of firewood. Twelve centimes were deducted from a man's daily pay to go towards the cost of his dinner, and we learn that the cast-iron system of allowing the same quantity of food to all alike, however differently constituted they might physically be, was not in vogue as it is with us, but that exceptionally large and powerful men received a double ration.

A recruit on joining was allowed a sum of 40 francs, which was to provide him with shoes, kneebreeches, gaiters, and shirts. He had to keep up these articles himself afterwards, and a sum of 10 centimes a day was deducted from his pay for this purpose. He was obliged always to be in possession of three pairs of serviceable shoes, and three shirts, and yet it is said that those who were careful of their kits could save something from what the authorized daily deduction just referred to left them, and that such savings were placed to their credit by the company to which they belonged.

The dress of the French army of eighty or ninety years ago did not prevent its accomplishing great feats of marching, and gaining brilliant victories, and yet must be pronounced to have been even less calculated for the soldier's comfort on service than the clothes men are to-day expected to fight in. Breeches buckled at the knee, stockings, shoes and gaiters, clothed his lower limbs. Each man carried a knapsack, musket, an ammunition pouch, and fifty rounds, a loaf of bread, a piece of meat, and either a camp-kettle or an axe, and was therefore not over-burdened, even

if somewhat heavily laden. Discipline must consequently have been indifferent, for we read that the first bivouac was usually enough to get rid of whatever of these articles could best be spared. The arrangements made for feeding the troops in the field were almost always quite inadequate, and many irregularities were the natural consequence of a system which opened the door to dishonesty and abuses of all kinds. Magazines of stores were not as a rule provided beforehand, but the chance resources of the country which formed the theatre of war were chiefly relied on. It is stated that often twenty times what was required might be brought into camp, and what was not used would be left behind and lost when the troops moved on. The regiments which subsequently arrived on the spot found nothing left for them, and devastated the neighborhood in their search for the means of subsistence. Cellars were broken into frequently, a cask of wine broached by the ready method of firing a bullet into its side, and when the men had drunk their fill, what was not immediately needed was allowed to flow away, and comrades overtaken in drink are said to have been left more than once to drown in such wasteful deluges. Sometimes, where plenty succeeded periods of privation, the troops in place of going to sleep after their day's march would sit up the greater part of the night cooking and feasting round their camp fires, and full hospitals were the consequences of such excess and disregard of dietetic rules. Cooks were eagerly sought after amongst recruits, and were welcomed before all others to the ranks of a company. The company cook did not go into action, but remained behind to provide for the evening meal, while each captain had a sort of freebooting retainer in his service, who foraged for his master. If in exceptional cases rations were supplied from magazines the officers and men alike received a sufficient supply of bread, meat, salt, rice, etc., which, eked out as it was by extras obtained from villagers or sutlers, enabled them to live very comfortably. A natural outcome of the system which prevailed was that the restaurants in Paris sent agents with supplies to follow the army, and catered for those who could afford to deal with them. Chevet, of Paris, especially was able to provide the good living and luxuries of the capital for his customers, but his prices were so enormous that only officers of the highest rank and highly paid officials attached to the forces could patronize him. When a district had been occupied for some time, and the inhabitants began to feel the pangs of hunger themselves, they took to hiding their corn and other food supplies in holes in the ground, or in the woods, that it might thus escape the rapacity of the invaders. The task of feeding the army was then a very difficult one, and often proved insurmountable in spite of the large numbers of comissariat officials who were with the troops. These gentry took but little trouble for anyone but the Guard. The ordinary linesman got often little but potatoes, while the horses had to do with straw alone. But care was taken that the Guard enjoyed plenty, and had enough to last four days, and then the Emperor was assured that the army was well provided for and contented.

These commissaries were extremely unpopular with the men, and justly so apparently. They seem to have cared little for the comfort of those

they had to look after, kept the best quarters for themselves, and amassed money in all sorts of irregular ways. They were corrupt in making contracts, lent money to officers, and adulterated the wine which was sometimes issued to the troops, as, for example, when the contents of the cellars of the Abbey of Mölk, and the monasteries of Neuberg and Raygern, were placed at the disposal of the soldiers for several months. On the eve of the battle of Wagram it is recorded that several commissaries were detected in the act of selling the rations intended for the Guard, and were shot a few hours later by Napoleon's orders, who determined on this occasion at any rate to make an example of them.

It is, nevertheless, difficult to understand how a leader with so keen an eye to details, and who must well have understood how detrimental to the army so irregular a system could not fail to become, allowed it to continue, and did not use his vast powers of organization to deal with the matter.

One direct outcome of such a state of things was marauding, which was carried out, under the guise of looking for supplies, in a most deliberate fashion. Nothing like a genuine and sustained effort was ever made to put a stop to it, except on the rare occasions when the army happened to be well found in supplies, and there was consequently less excuse than usual for the practice, but usually swarms of marauders hung on the flanks of the army, and sometimes it was even found necessary to detach a small column to turn them out of a village, of which they had taken possession, and refused to quit. When a man had been three days absent from the ranks he was declared a deserter; but the marauders took good care to return before the expiration of the third day, and thus escaped the consequences they would incur by a longer absence. The example set by the senior officers tended to encourage crime of this kind. When the soldiers saw, as they did especially in Spain, beautiful paintings, and the spoils of the churches and convents ruthlessly seized and sent on their way to Paris, they were naturally encouraged in their own lawlessness, and such conduct bore fruit not only in a general demoralization, but in the hatred and ill-feeling it aroused in the breasts of the unfortunate inhabitants of the plundered country. Priests denounced the invaders from the altar, and revenge became sanctified by religion.

Thousands of French soldiers were cut off and hanged by the infuriated Spaniards during those years, and at length their generals found themselves compelled to resort to the most extreme measures for the punishment of trivial offenses. Thus at one time when dysentery, caused by the troops gorging themselves with grapes, was decimating the ranks, and the vineyards were put out of bounds, several men who crossed the forbidden limits and entered them were shot for the offense. The state of our own army in the Peninsula has frequently been animadverted on, and Wellington has been blamed for the bad discipline which prevailed; but it is questionable whether the conduct of our adversaries was not even worse. Duelling, the child of insubordination, was rife in every rank, and was a recognized institution in the army. At one time in Spain all the officers of one regiment were actually pledged to fight all those of another, and it was

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only because Marshal Suchet ordered one of the regiments to march elsewhere in the nick of time that this combat *en masse* was averted. Not the least potent cause of this inordinate love of duelling was the system which brought about sudden and startling promotion, not beyond suspicion of favoritism. Men's minds, from bugler to marshal, were in a continual state of ferment as to promotion, and heads were turned by the brilliant examples of good fortune in this respect which were daily before them. "The cool shade of aristocracy" did not chill the ardor of the French recruit. Privates from the ranks had risen to be generals, and marshals and dukes, while Bernadotte had climbed to the throne itself. The spirit of gambling took the place of a sense of duty, and selfishness was the ruling principle of life.

By degrees the mushroom nobility which grew up round the Emperor became as grasping and unprincipled as the old. The sons of marshals, dukes, and courtiers were pushed forward with unusual rapidity. In the latter days of the empire, when many of the marshals and generals of France had become enriched by foreign spoils or the generosity of their master, and possessed luxurious mansions in Paris, or handsome country seats in its neighborhood, they began to care more for their comfort and the enjoyment of their gains, than for the excitement of a campaign. They felt more inclined to rest on their laurels than to acquire more, and so, to retain their services and stimulate their energies, the Emperor had to play on their greed of gain in another direction, and made the promotion of their sons and relations the price of renewed activity. The *Journal des Sciences* has recently published some information about the history of the marshals of France, which fully explains Napoleon's complaint that he "had made his marshals too rich." In addition to the privileges and precedence appertaining to the office and the yearly salary of 40,000 francs, we learn that he gave them large donations and emoluments in addition. Berthier, for example, received 10,000 francs a month as chief of the staff, and got no less than 1,255,000 francs besides in various ways every year. Davoust had 900,000 francs additional each year. Ney 730,000, Masséna 680,000. The others all got considerable sums also, although nothing like as much as those we have specified. Thus Lannes received 325,000 francs, Soult 300,000, Mortier 200,000, Marmont 120,000, and Macdonald 80,000. Altogether it is calculated that his marshals cost the Emperor the enormous sum of more than six and a half million francs annually. No wonder, then, as they grew old and gray, they felt inclined rather to enjoy what they had already gained than to add to their fortunes or dignities.

And in course of time aristocratic customs began to reappear amongst them. They held levees and received visitors with much of the old pomp and ceremony, and were styled "Your Excellency" and "Monseigneur." When the introduction of one's name in one of their despatches meant promotion, and the commencement, perhaps of a brilliant career, we may be sure they were duly fawned upon and flattered by their subordinates, and had their circle of courtiers like their predecessors of the *haute noblesse*.

The composition of the Guard and the favor shown to it had also an un-

favorable effect on the rest of the army. It always marched on the principal roads, and its comfort was first attended to by the commissariat department, the other troops only getting what it did not require. The best educated and finest men were drafted from the line to fill its ranks, and every man selected must have served for four years, and been through two campaigns. Thus it formed a veritable *corps d'élite*, but at the expense of general efficiency. Their comrades of the line nicknamed them the "Immortals," because they were seldom brought into action, but were held in hand by the Emperor till the crisis of the day, when they were put in with telling effect. They always wore their full dress in the field. Each rank in the Guard corresponded to the grade next above it in the line. Everybody naturally strove to become a Guardsman. The consequence naturally ensued that men were no longer content to serve from a sense of duty in the stations they were called to, but were ever restless, dissatisfied, and on the lookout for some chance of pushing their fortunes. The good and evil of such a system are here well exemplified; the tendency to insubordination and growth of selfishness, but at the same time the brilliant deeds of bravery and patient endurance to which it could goad some natures. The common soldiers took an immense interest in the way operations were conducted, and each had his own opinion on the subject. They cheerfully submitted to such privations as were inevitable, and eagerly volunteered for any dangerous enterprise, yet murmured if exposed to unnecessary hardships, and sharply criticised the orders of their superiors. They would freely follow a good general, but had an ill-concealed contempt for incapacity in high places.

Napoleon, whose successes were largely due to the rapidity of his movements, nevertheless adopted a method of marching which does not appear worthy of our imitation. According to his system the troops were on the road the entire day, even under ordinary circumstances. The men, therefore, did not get settled into their bivouacs till late in the evening, and in place of going to sleep sat up half the night cooking and eating. It was frequently found necessary, therefore, to halt for a day's rest, and no more was in the end accomplished than might have been done had the distances to be covered on each day been less.

Usually marches were conducted in this wise. A non-commissioned officer marched at the head of the columns and set a short regular pace. After an hour a halt, called the "pipe halt," was made, and the men were allowed to smoke for five minutes. At the dinner hour a rest was allowed for an hour, when the men ate whatever they had in their haversacks, and rested afterwards. During the remainder of the day the only halts were those which were made for five minutes at the expiration of every hour. The shoes which the French soldiers wore are said not to have been satisfactory, for the mud and dirt got into them in spite of the gaiters which were worn over them, and were a fertile source of blisters and sore feet. Commanding officers were enjoined to pay special attention towards obviating such casualties amongst their men, but nevertheless they suffered very much in that way. The carts and wagons of the peasantry were requisitioned to carry most of the baggage of the army, and the sick or offi-

cers travelling on special duty were provided with carriages by the same means. When the army passed monuments or tombs that recalled a brilliant achievement or the memory of some hero, the troops were called to attention and the officers saluted. The monument of La Tour d'Auvergne, who was styled "the First Grenadier of France," near Neuburg in Bavaria, was thus always treated with particular reverence by any body of troops approaching it, and his name represented the *beau idéal* of a chivalrous and thorough soldier to the French army of that time. Such observances tended to foster the soldierly spirit that then animated it. A lofty spirit of *esprit de corps* pervaded all ranks, and a display of personal courage evoked the warmest tribute of admiration, whilst anything like cowardice or lack of enterprise received well-merited punishment by a species of lynch law from the men themselves. Their generals and Napoleon himself set them a bright example in this respect, the brilliant Murat, a born cavalry leader, perhaps more so than any other. His handsome person, decked and bedizened in fur and lace, was ever visible far ahead of the line as it rushed on the foe, and it is said that he never returned from a charge without himself having taken an active share in the *mêlée*, and without having exhibited his preëminence as a swordsman. Ney's gallantry in action has become almost proverbial, and the way he led the last charge of the Guard at Waterloo one of the stock incidents of the battle. The order of the day, which was invariably issued after an engagement, if almost always expressed in pompous and exaggerated language, and sometimes conceived in what we should call bad taste, was nevertheless aptly suited to the minds of the audience, and never failed to appeal irresistibly to them. The soldiers were delighted when Napoleon told them that he was pleased and satisfied with their performances. They greedily listened as he recapitulated the incidents of the fight, and singled out for notice the most brilliant feats of his men; while, if he overstepped the bounds of truth in enumerating the number of prisoners captured or guns taken, his address wound up none the less effectively because of that.

A certain number of crosses of the legion of honor were then also usually distributed to each regiment engaged, of which the officers were allotted, perhaps, a dozen, and as many were given amongst the non-commissioned officers and men. The colonel decided who were to be the fortunate recipients, but the Emperor liked to present them himself, and thus enhance the value of the gift. The charm of his manner at such moments was most captivating. Each soldier was made to fancy that the Emperor had observed and specially selected him from amongst the crowd, and he carried away in his heart a few kind words that were never afterwards forgotten, and bound him by the bond of personal affection to his master. Sometimes, when the Emperor wished to produce a great impression, he would tear his own cross from his coat and pin it, with a few stirring words, on the breast of the grenadier before him. No wonder, then, that his presence with the army produced an electric effect; that the men followed him with the blindest confidence, and regarded him more as a beloved comrade than as a king.

But the soldiers were rewarded for their good behavior not by barren

honor alone. At the review which always succeeded a battle, the Emperor not only gave away crosses and decorations, but conferred the epaulets, which distinguished the officers, on those who were well spoken of by their commanding officers. And these latter, taking the cue from their leader, never failed to have a report ready for the occasion, couched in the same high-sounding words as his own bulletins.

These same reviews, interesting as they doubtless were in many respects, must, nevertheless, have often been looked upon as a great trouble and annoyance. After a tiring march, or a hard-fought battle, it must have been a severe tax on the men of the divisions or brigades who had to move forward to the place of assembly, and if the Emperor was expected at twelve o'clock we may be sure the soldier was already preparing for him at six, and was under arms on parade often some hours ere all was ready. Still, when at length the drums began to roll all along the line, and the familiar figure in green with the little hat was recognized riding up in the midst of a brilliant staff, from whose glitter he was distinguished by the simplicity of his attire, the effect was immense, and the shouts of "Vive l'Empereur" which greeted him were none the less hearty for the grumbling that had, perhaps, just preceded them. Napoleon delighted on such occasions to question officers and men as to the operations that had taken place, and liked to be replied to briskly and without hesitation, even if the answer were not strictly accurate. He always inquired as to the whereabouts of the absent, and was pleased when told that they had been injured by the bayonet. It therefore soon became the fashion to attribute most casualties to that weapon, although it is notorious that even at that time, when fire effect was comparatively small, bayonets were seldom crossed. Such inquiries, however, flattered and encouraged the men, and made them feel more than ever that they and their generals and their emperor were all members of one clan or family and were all in sympathy with one another. Their stubborn opponent, however, the British soldier, conquered under a system which ignored him in the distribution of honors or rewards. "His life of danger and hardship," as Sir William Napier tells us, "was uncheered by hope; his death unnoticed." Yet a sterner sense of duty animated his efforts, and sustained him under the trials and privations incidental to a reverse. It may be asserted that a British force would never have melted away and become disorganized as the French armies did in 1812 and 1815, and would never have so easily accommodated itself to the subsequent change of government. Personal ambition, competition to gain higher position, or to become rich, are inducements sufficient to prompt to soldierlike behavior when all goes well, but when hope has to be abandoned, some loftier motive must inspire the soldier to exert the self-denial such occasions call for. Bonaparte's proclamations to his army were often conceived in the spirit of a buccaneer, as when he said in 1796, "Je veux vous conduire dans les plus fertiles plaines du monde. De riches provinces, de grandes villes seront en votre pouvoir; vous y trouverez honneur, gloire, et richesses." It is no matter of surprise, therefore, that his army should break up when his promises were unfulfilled, like a disappointed band of pirates. Finally, his marshals, who owed him everything, fell away too, and with some note-

worthy exceptions, either joined the cause of the Bourbons, or found excuses to hold aloof from military service altogether.

His own ends being in the main selfish, self-interest formed the keystone of the military fabric which he reared. The story of French success under his command well illustrates how much may be accomplished under such a guiding principle, but the tale of their reverses as unmistakably indicates how poorly it will in the long run compensate for the absence of the chivalrous and disinterested allegiance which religion, loyalty, or patriotism seldom fails to evoke.

ARTILLERY FROM AN INFANTRY OFFICER'S POINT OF VIEW.

By Captain T. D. PILCHER, Northumberland Fusiliers.

(A lecture delivered at the Royal Artillery Institution, Woolwich, Thursday, 12th March, 1896.)

I SHOULD not presume to address this assembly on such a subject as mine were it not in the hope that by so doing I may encourage my brother linesmen to devote more time and thought to considering artillery questions. For it is only by studying the strong and the weak points of the other arms and by playing up to them that we can afford each other that mutual support which is absolutely essential to good results.

Many infantrymen have a fixed idea that there is some mystery connected with artillery subjects which cannot be solved by anyone not belonging to that arm, and, further, that it would be profanity in an outsider to try to solve these esoteric questions. That, however, this is not the case is proved by you having so kindly invited me, a linesman, to lecture to you here, at the Royal Artillery Institution at the headquarters of artillery in the British Isles on an artillery subject.

Coöperation between artillery and infantry has always been a matter of importance, but it is doubly so now that modern improvements have rendered artillery proportionately more effective and have at the same time made it practically impossible for attacking infantry under ordinary circumstances to drive defending infantry from a position until the latter have been thoroughly shaken by artillery fire.

Now, to be able to turn its attention to the hostile infantry, the artillery must first have gained an ascendancy over the hostile artillery, and let us consider what is necessary to enable it to do this. Some of the chief points are:

A more careful use of the ground.
Better fire discipline and accuracy of fire.
Better matériel.
Greater mobility.
Greater numbers.

May be that I am wrong in putting a careful use of the ground first among the essentials for a good artillery, but it seems to me that fire disci-

pline, first-class weapons, mobility and numbers can be of but little use if we allow the enemy to make the best use of ground and fail in this respect ourselves.

To take a case in point, on an artillery tactical field day I once saw three batteries come into action on a high ridge, two on one side and one on the other of a group of high firs, and at once open fire at where they thought the enemy was. I say advisedly at where they thought he was, for they failed to discover him until they had been pounded by him for some five minutes, during which time they, in their exposed position, would have been shot to pieces. As a matter of fact the enemy was in position at a range of about 2000 yards on much lower ground, firing cordite and with a dark wood just behind him. It was no doubt principally owing to this last fact that he was so hard to discover. Now, no excellence on the part of the artillery could in this case have made up for the original fault in the use of ground made by the commander.

I cannot help thinking that we Englishmen, cavalry, artillery and infantry alike, trust too much to our instincts as sportsmen, and do not sufficiently study ground from a soldier's point of view. The Germans on the contrary look at ground only from a soldier's point of view, and although most of them would make a poor showing at finding their way over a nice piece of Leicestershire they are masters in getting the greatest use out of every fold in the ground. To be able to make the best use of a country in a military and in a sporting sense are neither alternatives, nor are they the same thing, but both require a quick eye, presence of mind, determination and courage.

A good man to hounds, who can ride his own line, is pretty sure to have these qualities highly developed, and they are essentials, but they are not everything or a hunt stables would teem with commanders if, however, besides these qualities an officer possesses coolness and a thorough knowledge of his profession, he is sure to inspire his subordinates with confidence and will be a leader of men with a grasp of his situation and an ability to act on it, not possessed by a man who has not been trained to seize his opportunity, either in war or in that pursuit which a great authority has declared to be its image.

If the careful study of ground be neglected with us, as I am inclined to think that it is, reasons for it are not hard to find. Half of our soldiering is done on the plains of India, where the flat ground offers but little scope for utilizing contours, and a great deal of the other half at stations like this (Woolwich) where the limited extent of government ground available makes its careful study impossible.

The above remarks apply equally to all branches of the services and certainly not more to artillery than to the other arms, but as artillery is the subject which we have in hand this afternoon, perhaps I may be permitted to describe the way in which German artillery come into action, for I have had opportunities of studying the German army, which have been enjoyed by few foreign officers.

The commander of a unit, whether a brigade, battalion, battery or company, is always blamed if he sticks too close to his unit when approaching

the enemy, he should, according to their ideas, ride away well in front, study the ground and watch how, where and when he can most effectively and with least loss lead his command into action. In accordance with this rule the artillery commander is well away in front and, having chosen a position, orders his batteries to be brought up. If the position be a hill the guns are unlimbered 20 yards behind the crest and are brought up as much further as necessary by means of drag-ropes. I have often watched a position on which I knew it was the intention to bring up the artillery and have seen neither man, horse, nor the sign of a gun until fire was opened simultaneously from all the batteries. One battery is not allowed to open fire until all are ready, lest by drawing the whole hostile fire upon itself it should be crushed in detail. All that one sees of the guns in such position is a flash from the muzzle, and it is extremely difficult to locate the position of a battery if one sees nothing but his flash. Only smokeless powder is used. If the ground and trajectory now admit of it (and it must be borne in mind that the trajectory of the German field-gun is a good deal higher than that of our 12-pounder) the guns are now further withdrawn and indirect fire is entirely resorted to. I may say that indirect fire with clinometer elevation is rather the rule than the exception. Clinometer elevation most decidedly is the rule, as it is considered that much better practice can be made with the *richt-bogen* or spirit-level than with tangent scale elevation. The *richt-bogen* is moreover invariably used with high explosive shell, with which a great nicety of elevation is necessary for good results.

Every gun also carries a *richt-fläche* or kind of a sight-rule on a pivot, which can be fitted to the gun in a second and which has attached to it an arc off which can be read the angle which the sight-rule directed on the auxiliary object makes with the line of fire. The following instance will serve well enough to illustrate the manner of procedure.

On a certain day at last year's manœuvres the western artillery was in position, when seven batteries of the eastern force galloped up and unlimbered behind the crest of a hill. From the guns of six out of the seven batteries the hostile artillery position was quite invisible, but it happened that it could be seen from Nos. 1 and 2 guns of No. 5 battery. These two guns were laid direct on the hostile batteries, and after they had been laid the *richt-fläche* was directed on a church steeple about a mile off and the reading passed to the other guns. When the guns had once got the direction in this manner, the point of a sword was laid against the off wheel of every gun, a rod stuck in the ground behind the gun and in line with the sights, firing was commenced and the gun laid back on the rod. The whole thing was done in much less time than it has taken me to describe it. Perhaps, however, the more ordinary manner of procedure is not the one above described, but is first to lay the guns directly and then to retire them, after having fixed the rod in the ground as above.

Twenty paces is the ordinary interval between guns, but I have often seen 40 taken with the intention of deceiving the enemy as to the strength of the artillery, for when hostile artillery is a mile off and all that is seen of it is a flash from the muzzle, it is very hard to say at what interval the guns are placed.

I have tried to describe the manner in which German artillery come into position when good positions are to hand and the guns are not over crowded. I have, however, when positions have been limited, seen guns in action with only 10 paces interval, but it is considered as the result of experiments that artillery with guns at 10 paces will suffer four times as much loss as with guns at 20 paces. A smaller interval than 20 paces is consequently never resorted to if it can be avoided.

I have also seen two, and on one occasion three tiers of fire used. On the latter occasion the ground sloped about one degree to the front, and there was about 300 yards distance between lines. Guns were firing at artillery, range about 2500 yards, and they were firing over a valley.

When once established in a good position, the German artillery are most averse to leaving it, and I have never, at German manœuvres, seen the artillery brought up close to the infantry line previous to an assault. What the artillery does do previous to and during an assault is to redouble its fire, giving 200 or 300 yards more elevation and length of fuse in order to catch the hostile reserves moving up, and to preclude the possibility of hitting its own assaulting troops. The argument is used, that it benefits the infantry but little to have moving targets composed of their comrades of the artillery galloping about behind them, whereas the continuous fire of their guns is of the utmost value to them. I have talked to many officers, who were through the Franco-Prussian War, on this subject and have invariably been told that the occasions on which guns pushed up to within infantry range to support the attack were exceptional, and that when they occurred, some specific object was in view, as to knock down the walls of Fröschwiller at the battle of Wörth, which, owing to the configuration of the ground, could not be bombarded from a distance, and behind which the French were making a last stand. In answer to a question of mine on this subject, I have just received the following answer from a distinguished German officer which rather modifies what I have just said. He says: "I am of opinion that both in attack and defense artillery must not be exposed to infantry fire at the commencement of an engagement, or until the hostile infantry have suffered and been shaken. In defense artillery should if possible be 500 metres behind the infantry. Nevertheless it may be advisible in the attack just before the assault to send forward a few batteries into the foremost line. This procedure is also admissible in the defense to defeat the hostile attack. The moral effect of artillery in these circumstances will be very great. In these cases we may consider the hostile infantry as thoroughly shaken, and with shaken infantry one may dare to take liberties." But I must adhere to what I have said and I have never seen this done at manœuvres.

There are no hard and fast rules regarding tactics in Germany. Ground cannot be altered and formations can, and that formation is considered best which is best adapted to the actual ground and to the circumstances of the individual case. In conformity with this principle attack formations for infantry are never allowed to be practiced. A general officer, whose opinion on tactical matters is highly valued, and with whom I have had the advantage of very many long talks, once said to me, "I divide commanders into

two: Firstly, those who devise attack formations and apply them to the ground whatever it may be. Secondly, those who take the ground as it is, and who can on the spot make the best use of it. 'The former I do my best to rid the service of, the latter are my men.'"

Before leaving the subject of ground I should like to remark on the manner in which the Germans prepare positions for defense, but do not occupy them until the enemy has definitely shown his hand. Nothing is blamed more than a too early deployment either in attack or in defense. Let me quote the following example of what I mean. On the last day of the manœuvres at which I was last year present the division to which I had attached myself had received warning over night that it would probably be attacked next morning by a much superior force, and that it could not expect reinforcements until mid-day. It had consequently taken up a defensive position, shelter trenches were dug and gun-pits thrown up behind them. Three artillery positions were prepared, one facing S.E., one S. and one S.W. There were only two brigade divisions, *i.e.*, to sufficient batteries to occupy two out of the three positions prepared. Only a very thin line of infantry was thrown into the trenches, just enough to prevent inquisitive hostile cavalry coming up too near, and the whole of the rest of the force was kept in reserve under cover. Officers commanding sections in the line of defense receiving most definite orders not to occupy any part of the line in force, until it was beyond doubt that the enemy meant to attack it. There was excellent cover, a quarter to half a mile, behind the trenches.

Later on this same day it became evident that the enemy had 20 batteries and four infantry brigades, whereas the defending force consisted of six batteries and two infantry brigades. I asked the officer commanding the defense how long he thought he could hold out until support came. He said, "the mist to-day helps me, but on a clear day I could not hold out more than two hours in the face of the enemy's superior artillery fire," and turning to the officer commanding artillery, he asked him his opinion. He said, "I think, sir, you have over stated the time, I would not give you more than 1½ hours." This shows the enormous weight laid by the Germans on artillery fire. The hostile artillery positions were no better than those of the defense, and the defensive line of trenches was a very strong one, with a clear field of fire.

It is the rule for artillery in position to reconnoitre to its flanks by means of officers. On one occasion which I can call to mind this was not done and this neglect was severely criticised, for had an officer with glasses galloped half a mile to the flank he would have discovered the hostile artillery massed at about 3000 yards, behind a hill and well within reach of indirect fire.

From the question of ground we come to that of fire discipline and accuracy of fire. The rules as to the massing of guns, which obtain here obtain in Germany also, but great stress is always laid on keeping the whole of the troops firing at you under fire, for it is considered that the effect of the enemy's fire decreases 50 per cent. directly he hears bullets whistling about his own head.

At ranges over 1500 yards the guns of a battery fire in turn, at ranges under 1500 yards they fire independently.

XUM

No range-finders are used either for artillery or for infantry and German artillery officers say that their shells are the best range-finders.

The only missiles used by artillery are shrapnel, high explosive shell and case. The shrapnel has a combination time and percussion fuse, and contains a smoke-making substance, the smoke from which hangs together and rolls away like an old-fashioned cannon ball, and is very distinctly visible indeed. The use of this smoke-making substance lessens the difficulty of range-finding immensely.

The chief use of high explosive shells with field-guns is to reach troops behind trenches and earthworks, which would give them cover from ordinary shrapnel fire, and the manner of procedure is to burst the shell immediately over or just behind the cover, the force of the high explosive overcoming the velocity of the shell and sending the contents of the shell in all directions.

Firing at shelter trenches field-guns have a very fair effect when fired with time fuse, and much better than howitzers, mortars or garrison guns fired with percussion fuse at the same objects. The latter fire too slowly and have to drop their shell right into the trench for it to be effective. High explosive time-shells would at all events make it so disagreeable for infantry in a shelter trench that they would not stay still to be shot at without showing themselves, and if they showed themselves the object would be attained and shrapnel fire could be commenced. Two things are necessary for good effect with high explosive shells: Firstly, the length of fuse requisite must have been carefully ascertained with shrapnel. Secondly there must be plenty of ammunition. High explosive shells from guns and howitzers dropped into the ditch of a modern earthwork will demolish everything for yards in every direction.

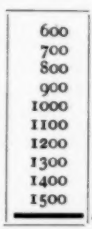
The Germans expect much better results against troops in the open with ordinary than with high explosive shell and will never use the latter unless the enemy cannot be reached by the former.

I should like now to give a short description of the *platte*, a little contrivance which is generally made use of when firing with the tangent scale and which renders it possible always to command the same distance for the time fuse and for the sights, thus avoiding confusion.

The time fuses are marked in yards, not in seconds, the fuses are inclined to burn too long, *i. e.*, if timed to burst at 1500 yards the shell is pretty sure not to burst under that distance, but under certain atmospheric conditions will often not burst until the shell has travelled 1600 yards.

It was found formerly, when it was occasionally necessary, to give an elevation for say 1500 yards and to use a time fuse for 1400 yards that mistakes were liable to occur, and in order to obviate this a *platte* is now used.

Under the above conditions the order would now be 1400 yards with two *platte*. The *platte* is a thin piece of metal which fits round the bottom of the tangent scale and obscures, roughly speaking, the last 50 yards elevation written on it, *i. e.*, if put into this diagram one *platte* would obscure the figures 1600 and the sight would



Platte.

read 1550 yards. One *platte* is equivalent to about 50 yards' elevation.

The advantages of this method are obvious, as they preclude the possibility of a slip of the tongue or of a misunderstanding from two distances being named. When using the *richt-bogen* it is also possible to command only one distance. Atmospheric conditions or differences in height between the gun and the target being made up for by the use of a screw which alters the lie of the spirit-level.

It is not my intention to enter into the much contested questions regarding the respective advantages of a small-bore high velocity and heavy carriage, as against a larger bore lighter carriage and less muzzle velocity, but I should like to mention a few of the most salient points in which German matériel differs from our own.

There is about 47 cwt. behind the horses going into action in a German field-gun; in one of our own about 45 cwt. A German battery has nine wagons, two of which contain high explosive shell, each wagon contains 75 shell and there is about 45 cwt. behind the horses. We have six wagons per battery, each containing 72 shell, and there is about 42 cwt. behind the horses. A German battery carries 140 man-killing projectiles per gun, excluding case, 115 of these are shrapnel with time and percussion fuse and 25 of them are high explosive. We carry 80 shrapnel and 20 common shell, but the amount of ammunition carried is being increased. The bore of the German gun is 3.5″, of ours 3″. Our shell and fuse weighs 12 lbs. 8 ozs. and contains 180 bullets. The German shell weighs about 18 lbs. and breaks up into 300 pieces. Nothing but smokeless powder is used with German field artillery.

Our gun has the greater muzzle velocity and the flatter trajectory, the German gun has the greater searching effect even with its ordinary shrapnel shell. There is no question that our guns are better horsed than the German and their mobility is greater. The Germans cannot turn out their horses, guns or harness anything like as smartly as our gunners do. It is marvellous how the Germans manage to get the amount of work out of their comparatively badly bred animals, which they undoubtedly do get out of them, and the reason they manage to do so is principally attributable to their excellent system of buying their horses as four-year-olds and keeping them in the riding school until they are six. They very seldom cast a horse until he is 18 and often not until he is over 20.

Whether we do not sacrifice too much to lightness having as we undoubtedly have better horsed artillery than any on the continent is a question I will leave to artillerymen. I say advisedly than any on the continent, for in this respect all accounts tell us that the Germans are far ahead of their possible antagonists. Whether also our present turn out does not necessitate too much time being devoted to spit and polish is a question which I will not enter into.

We now reach the subject of numbers. In the German army the proportion of guns to rifles is between five and six guns to 1000 men and the tendency is to increase the number of guns. At present the artillery is directly under the corps commander, but it is contemplated to split up regiments and to allot one artillery brigade of two regiments to each infantry

division. As I have already said enormous worth is in Germany laid on artillery fire. What the number of guns per 1000 men is, which we can afford to our regular and auxiliary infantry is no doubt known to most of my audience better than it is to me.

There are still a few remarks which I should like to make upon some points which I saw in Germany and which I consider to be of interest.

On the line of march the artillery generally followed the leading battalion, but in the case of a long line of guns a couple of companies were put in between every fourth and fifth battery.

A cavalry escort invariably accompanied artillery moving into position. When once in position the cavalry were usually relieved by infantry, unless there happened to be other troops in the immediate neighborhood, in which case no further escort was provided, it being laid down that it is the duty of the nearest troops to secure the safety of the guns. In the case of a special infantry escort this escort was usually thrown out in front of the guns.

For artillery to fire over the heads of infantry was not the exception, but the rule, being done every day. Sometimes the artillery in position and firing was only 150 yards behind the infantry line, and it must be borne in mind that the Germans only practice that in peace which they mean to carry out in war.

On a certain day at last year's manœuvres a rear-guard action was being fought and I was much struck by the masterly manner in which the artillery used the ground, never letting the attacking infantry within 1200 yards of them and retreating from position to position, hardly exposing themselves to fire and always, when in action, keeping their horses under cover. It is considered that in a delaying action infantry should never allow hostile infantry to get within 600 yards of them, for that if they do so they will find it impossible to withdraw.

The key-note of the whole German army and the secret of its efficiency is decentralization. This begins from the bottom and works up. From the day an officer joins he is accustomed to responsibility. Commanders of squadrons, batteries and companies are practically independent, their immediate superiors may inspect them, but are forbidden to lay down what parades they shall hold. At manœuvres I have never seen any interference on the part of battalion or regimental commanders with their subordinates, a man receives his orders and he is allowed to carry them out his own way. An officer is often asked afterwards why he did so-and-so, and is either praised or blamed for his correct or false appreciation of the situation. It is acknowledged that in war a company once committed to action is like an arrow from a bow which can only be gathered when the ground over which it was sent has been won. It is acknowledged that the only way of sending up orders to the firing line will be through reinforcements and when a company is once committed to action the commander is independent.

If an officer is found to be unfit for his responsible position, and every post carries with it a great deal of responsibility, he is retired with a small pension, and this is a matter of every-day occurrence, a great number of compulsory retirements taking place in the lower ranks.

This system of decentralization immensely lightens office work. There are two staff officers to a division, each of whom does on an average two hours office work a day, for hardly anything gets as far as the divisional office and still less goes past it. But to return to the subject of my lecture from which I fear I have diverged.

There are one or two points on which I should—if I am not delaying you too long—like to say a word or two.

It is a disputed point at what distance infantry on an equal front will be able to get the better of artillery and the following results of firing at long ranges may be of interest. At Meean Meer at 1900 yards at two targets, each 8′ × 12′, 1360 rounds were fired, these rounds could have been fired comfortably in four minutes by 100 men, there were five hits, that is .36%. At Karachi at 1300 yards at a target representing five guns, 20 gunners and also two screens 2′ × 12′, representing an escort, 620 rounds were fired, there were 15 hits, *i. e.*, 2.42 per cent., this would represent the fire of 100 men for two minutes.

I should like to quote the opinion of a distinguished German officer on this subject in writing to me, he says: "We are of opinion that at 1100 yards and at all nearer distances infantry will get the better of artillery, if both open fire simultaneously, and that they will gain the upper hand even if the artillery are able to provide cover for their men up to their waists. It is only when ground is so formed that the guns only show their muzzles above the crest that artillery can fight at such short ranges."

There is no doubt a great future for machine guns, and as the results which I am about to quote will show a machine gun is at practically all targets equal to the fire of 30 rifles, and at some targets equal to a great deal more. One great advantage they have over infantry is that you can see with them where your bullets are going and can range, moreover, being as they can be in the charge of picked men, the chances are that hits in war will bear a better proportion to results obtained in peace than would be the case with ordinary infantry fire.

In no way can machine guns take the place of artillery in European warfare any more than they can supersede infantry. They will, however, if properly used, be a most valuable adjunct to infantry and in many cases, such as holding a defile, guarding a flank, etc., will often free half a company. Moreover it would be difficult to exaggerate the effect which, under certain circumstances, a few determined men with a machine gun and a bill-hook to improvise a little cover from view, could have on an advancing column. Cavalry, however good they may be, cannot search every bush in an enclosed country and a machine gun does not take much concealing.

The following comparative results of machine gun and rifle fire made at Hythe last autumn may be interesting.

Target a battery of six guns, 54 gunners, six limbers, six ammunition wagons at five ranges between 1550 and 1700 yards. Firing 633 rounds, which they could fire in one minute, two machine guns got 81 hits on, including 17 on the gunners—40 men firing 600 rounds at the same target, which they could fire comfortably in about five minutes, got 53 hits on, including 18 on the gunners. The percentage of hits on the whole target,

guns, limbers and gunners was in the case of the infantry, 8.83, and in the case of machine guns, 12.79.

We may calculate that in either of the cases just quoted about 15 gunners, *i. e.*, 28 per cent. of the men of the battery were hit. The distance was found with a mekometer previous to opening fire. It may be presumed that the 40 men shooting were all picked shots, or they would not have been at Hythe.

It probably took about one minute to get the range with the mekometer.

I think that we may safely conclude from the above experiments that at ranges over 1000 yards, and sometimes as great as 1700, both infantry and machine guns may reasonably expect under favorable circumstances to make it extremely hot for a battery, if they are already in position when the battery comes into action, and they will have the great advantage that they are usually much more easily concealed than artillery, and they may inflict heavy loss without the enemy knowing whence the fire is coming. I am speaking of the exception, for there is no doubt that under ordinary circumstances artillery can, even in peace in a given time with a given frontage produce more effect on a target than infantry can at ranges much over 1000 yards.

There is great difficulty in deducing from peace experiments what is likely to be the effect of fire in war, for here human nature has to be taken into consideration and this is a factor for which we cannot legislate. All experience teaches that only a very small percentage of the effect produced by a body of troops firing in peace can be expected in war, and that percentage will vary in proportion as the troops firing are well or badly disciplined. Whatever the above percentage is with infantry, it should be greater with artillery, who for many reasons are less influenced by the altered circumstances of the case. This fact must be borne in mind in connection with the comparative effect of artillery and of infantry fire at more or less similar objects in peace.

The following are, I think, among the chief points which strike an infantryman when first seeing artillery practice. Knowing how very easy it is with a rifle to fire to the right or to the left, infantrymen find it hard to believe that the lateral error of artillery is "nil" and that the depth covered by shrapnel is as great as it is. Perhaps it is owing to this fact that we so often at manœuvres and on field days see infantry advancing in fours within easy artillery range.

Again an infantryman is apt to forget the great difficulty which artillery will undoubtedly have in ranging in war, and the enormous difference which the ground on which shell burst makes to artillery in finding their range, and consequently an infantryman is also apt to forget the necessity (insisted on in the drill-book) for infantry in their advance to avoid prominent objects on which artillery find it easy to range. On this point I should like to remark that the smoke-making substance in the German shell which makes the smoke hang together after the shell has burst, when fired either with time or percussion fuse, must immensely facilitate ranging on difficult ground.

In considering artillery questions an infantryman is also apt to forget the difficulty which artillery will have in observing the effect of their own fire at long ranges, and also their difficulty in distinguishing their own from the enemy's troops, and in this respect he is inclined to attribute to them powers of vision and of discrimination, which are more than human.

Modern guns firing shrapnel have never yet had an opportunity of showing what they can do on a battle-field, and one of the first surprises of the next European war will be that we shall hear that artillery, under favorable conditions, have within a quarter of an hour swept away half an army corps.

In conclusion I have only to thank you for the kind manner in which you have listened to me and to assure you that if I, an infantryman, have said that I see a moat in my brother's eye, that I am perfectly aware that there is a beam in my own.

DISCUSSION.

MAJOR E. S. MAY.—Sir Redvers Buller and gentlemen, I wish some one better qualified than I am had been called upon to open the discussion which is sure to follow so excellent a lecture as the one we have just heard; but since it has fallen to my lot I feel I cannot do better than commence my remarks by assuring Captain Pilcher of the great profit and pleasure with which I have listened to what he has had to say; and I am sure I can speak for all of you when I tell him how glad we are to hear an infantry officer lecture in this theatre, especially when he deals with a subject which appeals particularly to us, and brings with him so much valuable information. There are a great number of officers, I have no doubt, who wish to enlarge on different points this evening, so I will confine myself to one or two, speaking, I trust, in no critical or controversial spirit, but rather seeking for further details which may clear some doubtful matters up. The thing that puzzles me a little and which I feel most interest in personally, is this high explosive shell which Captain Pilcher has alluded to. I think we all recognize the value of such a projectile in this country, and personally I have always been an advocate of howitzers, but we have had a certain number of very serious difficulties to contend with hitherto in connection with it. It has been recognized first of all that this high explosive shell, unless fired with a very low velocity, may burst prematurely and that, if such a thing occurred, it would probably shatter and destroy the gun altogether. I should like to know whether, and if so, how, the Germans have completely got over their difficulty in that respect and if they are not troubled by our anxieties. Then there is a difficulty with regard to ranging with high explosive shells. The high explosive gives off hardly any smoke—the burst is shown simply by a flame—it must often be extremely difficult to see that flame, and unless there is some smoke-producing compound included in the shells I find it difficult to understand how they can pick up the range for us, especially when fired in the air with a time fuse. Moreover the presence of adjacent batteries or guns would not greatly facilitate the task. Because we must remember that although we might have a battery firing with ordinary field-

guns exactly alongside one using these high explosive shells, unless the same fuses were used to ignite them and the ordinary shrapnel, I do not see how its experiences would help us very much; we all know that, even if we fire with fuses of exactly the same pattern, there is the error of the day to be accounted for in the case of the fuses as much as in the case of the powder charge, and that the same pattern fuses unless of the same date of manufacture do not always burn at the same rate, and where the fuses were not of the same pattern, as I presume they would not be in the case referred to, it seems to me that the results obtained with one battery would help you very little with respect to another. And again, do the Germans use a high explosive in the shells of their ordinary field-guns? Because in this country, I think I am right in saying that the best authorities do not regard a high explosive from so small a gun as a 12- or 15-pounder of very much account. Even with the largest field howitzer hitherto introduced I do not think that the diameter of the circle which may be taken to represent the area over which the high explosive operates is more than about 30, or at the outside 40 yards; it has indeed been put as low as 10 and 20 yards, although that is probably a false estimate. When you consider the depth that the shrapnel covers effectively I think it is easily understood that if you only made use of a small shell, such as an ordinary field-piece fires, you would get a very small destructive area and must lose a great chance of hitting men. These are some points I wish to ask Captain Pilcher about particularly.

Then there is another matter that needs clearing up and upon which the lecturer with his foreign experience may be able to enlighten us. Do the Germans when a small body of troops is concerned, attach artillery to the advanced guard? By a small body I mean a force of a division or thereabouts. There is nothing laid down in our official manuals upon that point; but I have noted that some books on tactics in this country say that it is right to attach two guns to the advanced guard of a division. The idea of breaking up a battery will hardly commend itself to any of us; and I understand the French do not allot any artillery at all to an advanced guard if it be smaller than an infantry division. It would be interesting to hear what the German practice is.

Finally, perhaps, I may be allowed to mention a question connected with infantry and artillery tactics which rather interests me. The other night I was lecturing myself to an Infantry Tactical Society and I was asked during the discussion which followed by an infantry volunteer colonel, "How do you recommend infantry to attack artillery?" Now I do not think it would be of the slightest interest to anybody here to know what answer I gave; but I dare say many would like to hear what Captain Pitcher has to say upon that subject and so I will pass the question on to him, if he will let me. I may, however, say this, that I cannot think the cut and dried procedure we sometimes see at manœuvres is a judicious one. An infantry attack is broken up into five lines altogether, and it can hardly ever be right for them to advance straight on the guns as we sometimes see them do. There is a first line, a second line and a third line in the orthodox formation, and the first line is further to be sub-divided into three

parts, firing-line, supports and reserves. I think when those five lines come rolling on that, if we do not hit the first we may expect to hit the second, and if we do not hit the second we ought at any rate to hit the third, if we did not, the fourth at least should receive the benefit of our shells, but, if it did not, and the fifth escaped also, then indeed we should have cause to blame our ammunition.

CAPTAIN J. HEADLAM.—Sir Redvers Buller and gentlemen, there is so much that is interesting in Captain Pilcher's lecture and I agree so fully with the greater part of what he has said, especially as to the necessity for the most cordial coöperation between the artillery and the other arms that I feel as if it would be rather ungracious to criticise. At the same time there are some points in the lecture in regard to the training and equipment of German field artillery which, if they were left without remark in such a meeting as this, might naturally give the impression that in those respects the Germans were ahead of us. I believe the contrary to be the case. The first point is the equipment itself, the general question of the weights and the amount of ammunition carried. Captain Pilcher said that the weight of the German shell was about 18 lbs., the weight I have always heard of is 15⅝ lbs., whichever is right, it is, of course, a heavier shell than that of our 15-pdr. The number of rounds per gun carried in a German battery is 147, in our 15 pdr. equipment it is 144. But to carry their extra three rounds a gun they have nine wagons instead of six. You must remember that these nine wagons are not with the battery, or even with the brigade division, four only are with their batteries, the remainder are behind the whole artillery unit; that is to say, behind all the divisional, or all the corps artillery you have this great mass of wagons, in the case of corps artillery amounting to 40 wagons. That is not quite the same thing as being actually with the batteries. It certainly seems to me that we are better off with 144 rounds and six wagons, than the Germans with 147 rounds and nine wagons. In the horse artillery they have indeed got a considerably heavier shell, but they have also got 6 or 7 cwt. more than we have behind their teams and only 32 rounds with gun and limber while we have 50. I am sure that all horse artillerymen will agree with me that for horse artillery requirements our equipment is far superior.

The other point I wished to touch upon was the training as regards fire from behind cover. The lecturer has said that with the Germans now this fire is practically the rule and he has described to us the instruments used. They are in my opinion very interesting but very complicated; the French, I believe, have still more complicated ones, the Italians also and I daresay the other nations. What I want to assure officers, and I have practised with these German instruments, is that our aiming posts will do all the work that the *richt-fläche* does very much more simply and accurately. But the question of what instruments you use is not important, we all know that under favorable circumstances you can make very accurate practice from behind cover. It is to the use of such practice on the battle-field that I believe there to be such strong objections as to render any general employment of it absolutely out of the question. To begin with, it is very rare to find ground where you can carry on the practice with more than a

single battery. Besides that you cannot change your target without making all sorts of elaborate arrangements, you cannot concentrate your fire and you cannot fire at moving targets at all. Those are, to a certain extent, technical objections. There is a very much stronger one and that is the moral objection. If you train field artillery to consider firing from behind cover as "practically the rule," I believe you will destroy the whole spirit of the arm and I cannot help thinking from what the lecturer has said, that that is what is occurring to some extent at any rate in Germany. The lecturer says he has never seen in the manœuvres the German field artillery accompany the infantry in attack; he certainly read a letter from a distinguished German officer who pointed out that some persons, at any rate, considered that they should do so; but, if the lecturer has never seen it done, it must be sufficiently rare and if batteries do not do it at manœuvres, will they do it on service? In the Franco-German War there were many occasions where the artillery came up to very close ranges, not only for such special purposes as the lecturer has mentioned. For instance, in the battle he has referred to (Wörth) the batteries prepared the way for the assault of Elsasshausen by their fire at very close ranges, and then when the village was carried and the German infantry, as the official account admits, was absolutely unable to withstand the French counter attack, two batteries of horse artillery coming into action on the ground just won, stopped that attack with ease. I know that I am not alone in thinking that such occasions will occur again, and I firmly believe that if in manœuvres you train batteries continually to use fire from behind cover, and to remain in their positions while the infantry advance, when in war occasions arise for their use at close quarters they will not be there.

In conclusion, there is one question I should like to ask; the lecturer has spoken about firing in tiers—sometimes two and three tiers—I should like to know whether the German artillery ever fire in tiers in reality at practice, or only with blank at manœuvres.

MAJOR H. C. SCLATER.—Gentlemen, there was one point which the lecturer dealt with for a considerable time and that was the question of long range infantry fire and the effect likely to be produced by infantry firing upon guns. I may mention that I was very much interested last year and the year before, in some small experiments instituted by Lord Wolseley, then commanding in Ireland, which took place at Glenbeigh in connection with this subject, from which we all got a great deal of instruction—both infantry and artillery. In Ireland there was at that time no infantry range upon which long range firing could take place, though that is being remedied now, whilst in England the ranges are few; and I would strongly urge that our artillery ranges should be utilized for combined field firing by infantry and artillery, and that a detachment of infantry should also be present during at least a portion of the period when gun practice is being carried on. Their presence being utilized by firing at various ranges at targets such as artillery would represent on service, and from which gunners would derive much instruction as to what they might expect to encounter on service, and enable them to draw tactical deductions therefrom; such practice could not fail to be of interest to the infantry, as giving them the oppor-

tunity of ascertaining the vulnerability of an artillery target, and the best way to attack it. The general deduction we drew from our experiments was that horses should not be brought within 1500 yards of steady infantry when coming into action or on the march. When limbering up at that range difficulty would be experienced and if you come into action against infantry in position who were not being fired upon by anybody else at ranges under 1500 yards you would lose most of your horses or a great number of them. With regard to the gun detachments we found that at 1200 yards but small results were produced by very carefully aimed volleys from a line of rifles occupying much the same front as the guns they were attacking, but when they got to 1000 yards the detachments began to lose fast, though with well posted guns and detachments it seemed as if the guns could be fought for some time. Beyond 1500 yards the effect of long range rifle fire rapidly diminishes, as a rule the fall of a bullet cannot be seen, and except at large targets and when ammunition is abundant it is not worth the expenditure of the ammunition. Some good practice was made at a target representing a battalion in quarter-column at a range of 1800 yards, but very poor results against guns in the open at this range. Beyond this range results were practically nil. It is perhaps worth noting that even last year there seemed to be quite an open question as to the best way of firing these long range volleys, the size of the fire unit and what the system of distribution of fire should be adopted, we also noticed that better results were obtained when the volleys were fired quickly with little interval, than when fired deliberately with careful working by N.-C. officers and officers. These questions were much discussed by the infantry officers who were present at Glenbeigh at the time, including the officers of one of the courses which was then at the camp. Such combined practice cannot fail to be of interest to all concerned and I trust that it will be an annual institution at all our camps.

LIEUT.-COLONEL R. W. RAINSFORD-HANNAY.—Sir Redvers Buller and gentlemen, a good deal has been said about high explosive shell this evening. The following paragraph taken from a lecture delivered by Major Shewell, R. A., at the Royal Engineer Institute, Chatham, gives I think a very good summary of the general opinion of the use of high explosive shell as an auxiliary to the fire of field-guns. "Against troops in the open high explosive shell do not, and can never be expected to equal good time shrapnel, in which control can be exercised over the direction, force and size of the bullets, which is not possible over the pieces of a high explosive shell. Howitzer fire of shrapnel with its high angle of descent and low velocity is of little value for any purpose. Thus the high angle fire of high explosive shell, though it can well supplement, can never replace the direct fire of field-guns."

Then, gentlemen, the lecturer has shown us a contrivance by means of which the Germans can use their tangent scales and fuses at the same reading in yards. I do not see that it is simpler, or more easily managed, than our own system of having a different notation for tangent scale and fuse and it does not appear to be applicable to clinometer elevation, of which the German artillery make considerable use.

We have had a good many statistics given us of the effect of long range infantry fire upon artillery. The following details of an experiment carried out at Lydd in July, 1894, showing the relative power of field-guns and rifles at long ranges may be interesting :—

Target, a field redoubt, 25 dummies were placed on the banquette with their heads showing over the top of the parapet, 25 dummies behind the rear casemate, range 1050 yards, number of bullets 5000.

This was fired at by 200 infantry with Lee-Metford rifles ; ranging volleys were carefully fired by sections. The general results of these volleys could be fairly well seen by the dust thrown up by the shingle where the bullets struck. Result 49 hits on 24 dummies. The same target was attacked by a 12-pdr. B. L. gun firing a 15 lb. experimental shrapnel shell with time and percussion fuse. The shell being experimental, the officer in charge of the experiment had no range-table nor had he a fuse scale, therefore many of his rounds were used in ranging. Range 1850 yards, rounds 20, giving a total of 2200 bullets. Result 26 hits on 17 dummies. The infantry fire was most deliberate and took an hour. The artillery fire too was slow and took 15 minutes.

Tabulating these results we find—

Range	about	2 : 1	in favor of	the artillery.
Time	"	4 : 1	" "	"
Personal	"	20 : 1	" "	"
No. of bullets		2 : 1	" "	"
Hits		1 : 2	" "	"

Now multiplying these ratios together, as you do to get the resultant of a combined system of mechanical appliances, we get an advantage of 160 : 1 in favor of the field-gun (laughter and applause).

COLONEL G. H. MARSHALL.—Gentlemen, the lecturer, in speaking of the Germans, said great stress is always laid upon keeping the whole of the enemy's troops under fire, for it is considered that the effect of the enemy's fire decreases 50 per cent. directly the soldier hears bullets whistling about his own head. This calculation must be of course a surmise ; but granting it is true I would like to know what is the result. I think it comes under the head again of what Captain Headlam mentioned ; it is merely another form of cover. If a general orders his artillery to come into action he wishes for some effect ; he wishes either the enemy's guns to be silenced, or for some crushing concentrated effect upon the enemy's infantry ; I do not think he would be satisfied if he found his artillery frittering away their fire and that they were quite satisfied because they were receiving 50 per cent. less damage. I had hoped that this question had been finally settled. Many of us will recollect the very interesting discussion which took place in this room between an officer who was an exponent of the German ideas and the general officer now commanding this district.

The lecturer has put it to us to decide whether we do not spend too much time on "spit and polish." We know that the words "spit and polish" are used by many people as a term of reproach, meaning that the soldier is devoting too much time to the appearance of his arms, accoutrements and horses. In this matter I think that the soldier should not be

judged differently from the civilian. If your coachman brings your carriage and horses to your door with your horses badly groomed and everything slovenly turned out you do not commend him or raise his wages; you probably get rid of him as careless and inefficient. Many batteries come under me every year at Okehampton, my experience is that in a battery where the officers and men are well dressed, the horses, harness and equipment smartly turned out, these are signs of energy and zeal in essentials as well and that such a battery will also excel in drill, manœuvring and shooting.

REPLY.

CAPTAIN PILCHER.—Gentlemen, the first question that Major May asked was about the premature burst of the high explosive shell. In every brigade division in Germany one battery has new pattern guns. I think the pattern is 1892. These guns are made of some peculiar new steel and the high explosive shell bursting in the barrel will not damage the gun. The other batteries of that brigade division do all their firing with high explosive shell out of the guns of this battery. In war the other batteries will have to take their chance until they all get the new pattern gun. It is, however, considered that the chances of a shell bursting in the gun are so small that there really will not be a great deal of risk run. In firing high explosive shell they range with ordinary shrapnel, containing the smoke-making substance, which I have tried to describe and I am practically certain that they use the same fuse. The battery that is going to fire the high explosive shell first fires for itself with ordinary shrapnel shell and gets the exact length of fuse requisite. These experiments that I have spoken of were carried out with an ordinary field-gun, not with a howitzer. It is only when they cannot get at troops with ordinary shrapnel that they fire high explosive shell. They acknowledge that the effect with ordinary shrapnel against troops in the open will be very much greater than with high explosive shell.

I have never seen artillery with an advanced guard when the force has been less than a division.

With regard to the question of "How do infantry attack artillery?" I think there is only one answer, and that is that it must depend upon the ground. Certainly the very worst thing that could be done would be to advance in lines one behind the other, but surely against infantry fire the same rule holds good, for with an infantry bullet there is even a greater dangerous space than with the bullets in a shrapnel shell. The Germans carry 140 rounds, but I think I made a note of that just now.

CAPTAIN HEADLAM.—147 rounds I think. That is including the nine wagons.

CAPTAIN PILCHER.—Yes, and the case too. I purposely did not include case.

CAPTAIN HEADLAM.—Yes, I think so.

CAPTAIN PILCHER.—In speaking of our batteries, Captain Headlam should, I think, have said, when contemplated alterations have been carried out our batteries will carry 146 shell; there is great difference between the present tense and the future. Captain Headlam in speaking of our equip-

ment has spoken of what will be, I have only spoken of what is. I have never heard the Germans speak of the *richt-bogen* and *richt-fläche* as being complicated, they certainly did not take long using them. The *richt-bogen* is an instrument they invariably use,

CAPTAIN HEADLAM.—I did not say a word against that.

CAPTAIN PILCHER.—The *richt-fläche* is not really used very often. I quoted an instance, but I said afterwards that the ordinary mode of procedure was with a couple of rods. It is all very well to talk about training your men to imagine that they are going to be shot to pieces and teaching them to expose themselves; but if the men do expose themselves unnecessarily and are all shot, there will not be any left to fight. There are many occasions when we must all expose ourselves, but we should not do so unless it is impossible to obtain equally good results from under cover. It must also be borne in mind that troops firing from under cover will be firing under what are comparatively peace conditions and this will make a great difference in the accuracy and effect of their fire.

To make good use of ground and to get good results from indirect fire is difficult; to come on to a crest (in peace) and to fire directly is easy. Practice the more difficult, the easier part will come of itself.

With reference to tiers of fire I have been asked whether it was at manœuvres that I saw them employed. Yes, it was at manœuvres, and I saw them placed in the same way as they would be placed in battle. I do not see why artillery should be afraid to fire over their own heads, when it is regarded as a matter of course that they will fire over the heads of infantry. I asked a question the other day respecting tiers of fire, and the officer whom I mentioned just now kindly sent me the following notes, he says, "In artillery positions the first thing is effect; cover is of secondary importance. The configuration of the ground must determine these points. We use tiers of fire, when the ground allows it, in order to decrease the effect of the hostile artillery fire. We wish to oblige the enemy to range on every single battery. The control of fire must however remain in the hands of one man, and on account of the effect of fire, intervals and distances should not be diminished. It is seldom that ground fulfils all the conditions necessary to enable us to use tiers of fire."

I was much interested just now when Major Sclater said something about Glenbeigh. Captain Crampton very kindly showed me a valuable report he is drawing up upon this subject; but in it he did not seem to give credit to infantry for firing quickly enough. He calculated the amount of weight of metal which infantry would fire within a certain time, the infantry occupying a certain frontage. He calculated that a man would fire about one and a half rounds a minute. Infantry can very comfortably, without hurrying themselves the least bit, fire 3½ to 4 rounds a minute.

CAPTAIN PILCHER.—With regard to what Lieut.-Colonel Rainsford-Hannay has said about the experiments at Lydd the 200 infantry could have fired the 2200 rounds comfortably in 2½ to 3 minutes instead of taking an hour over it, and this would make a difference in his mathematical conclusion.

As to what has been said about concentrating fire, first on one battery and then on another, this is a subject I have spoken about often in Germany, and the argument they use is that human nature must be taken into consideration, and that the instinct of men is to fire back at those who are firing at them. It is of course easy in peace to say you are not going to do this, but in war it is very different. Human nature is a thing you cannot legislate for, to attempt the impossible is to court defeat, besides which, to follow the course above indicated unless you are very superior in numbers or are much favored by the shape of the ground, would be to allow part of the enemy's force to fire at you under peace conditions.

THE CHAIRMAN.—I think, gentlemen, you will all agree with me that we have listened to a most interesting lecture and discussion; and although the discussion has travelled over a wide ground and has embraced many topics, I do not intend to refer to all of them. But there are two or three which seem to me to be interesting, some of which have not been noticed. And first and foremost I should like to refer to the point the lecturer began with, which I believe is really almost of the greatest importance, and that is the question of the knowledge of ground. It is one of the greatest drawbacks to military training that we have in England, probably, because of the great difficulty with which our manœuvres are carried on, and of the very great difficulty we have in getting any sort of available ground on which we can properly conduct the manœuvres, that we have not, I think, sufficiently paid attention to the enormous importance of the study of ground. I do not mean in relation to the large pieces of ground, or the question of fields and valleys, but the question of undulation; and in that very question of undulation is to be found I believe the answer to the question that was asked as to how we should best attack artillery. I believe there is hardly any position that the artillery could take up that could not be approached almost with impunity, by a comparatively small force sufficient at any rate to very seriously damage the artillery when they got near them, if there was not some corps or some scouts a considerable distance from the artillery watching it, and I am sure any officer who has studied the extraordinary effects of ground and has stooped and paid attention to the varied formation and characteristics of the surface will some day make his mark when he puts the result of his study into practice.

And then with regard to that point that the lecturer mentioned about the insistance of the Germans that the commanding officers should separate themselves from their command, that is the old question of where the officer commanding the horse artillery should be, when the horse artillery are acting with cavalry; and I know very well that many officers think that he should be always with the battery, but it has been decided now the other way. At any rate the advantage of his being away from the battery is that he has much more power and much more time to select his ground for the artillery than he would otherwise have; and exactly the same remark holds good with officers holding commands of regiments. I have never seen a battalion commander far enough, in my opinion, in front of his battalion when manœuvring. I hope when we do get more ground, or more facili-

ties for holding manœuvres, it will be one of the first lessons we shall try to teach that the commanding officer should separate himself from the details and duties of command and take general charge of his unit.

Then the question of the advance-guard battery has been mooted. But surely that must be a question of what your advance-guard has got to do; and the composition of the advance-guard must entirely depend upon the duties it is called upon to perform. The general argument would be that, as a rule, with a small force you ought to keep your artillery behind the advance-guards. As for machine guns, for my part I think in this theatre, at all events, we may leave that subject by saying that I do not think the artillery arm of the service has anything to fear from any great advance made by the machine guns.

The question of the value that is to be obtained from infantry and artillery fire I think again must be left to the discretion of those upon whom the duties fall.

Then the lecturer has made a great point of the Germans and their high explosive. I certainly thought that they had not got a high explosive for their field-gun. As far as our experiments have gone the advantage that is gained by putting high explosives into a shell of small calibre is so very small and the danger on account of the fuses and so forth is so great that up to this time we have not dared to undertake it; and I believe myself that the Germans are in exactly the same state.

ON MORAL INFLUENCES IN WAR.

By Lieut.-Colonel P. NEVILLE, 14th Bengal Lancers.

(*Lecture delivered at the United Service Institution of India, on the 14th July, 1896.*)

THE conditions which tend to decide the fate of armies in the field are ever exposed to the over-rule of the factor "unforeseen," which we are used to call "chance" or good or bad luck, as the case may be.

What seems to be the veriest accident will oftentimes frustrate the most ably-laid schemes of the greatest general, as was the case at La Rothiere in 1813, when the interception of a dispatch led to the defeat of Napoleon by the Allies. Again a little thing—a sudden change in the weather, the rising of a river, a heavy fall of snow, a thick fog, may cause the scale of victory to turn in favor of the side against which appeared to weigh the certainty of defeat.

If, however, we eliminate this important factor, we may conveniently classify the remaining influences which bear on the result of military operations under two main heads—the physical or material, and the moral Physical influences will readily be understood even by those unacquainted with the art of war. These are such things as—disparity in numbers—inequality of armament—plenty or scarcity of food and clothing—good or bad ammunition supply—the nature of the ground an army must pass over with regard to the obstacles to be surmounted—the state of the weather, which

materially affects the confort and consequently the fighting spirit of the troops, and many other things of a like nature. But what my non-military hearers will find more difficult to apprehend is the fact that in warfare there are moral influences, unseen, unheard, acting in silence and obscurity on the individual minds and spirits of the soldiery, which in the aggregate are more powerful for good or evil than any of the physical factors I have mentioned. Some of these have enabled armies to contend against and overcome great difficulties and dangers, while others have caused panic and disaster in the ranks of those who apparently had every advantage in their favor.

Each material advantage or the reverse, carries with it a corresponding moral influence favorable or otherwise: on the other hand, purely abstract moral elements are none the less powerful for good or evil. Take for example the presence of some great leader in whom the soldiers have implicit confidence. In the early years of this century the presence of Napoleon on a battle-field was said to be equal to an army corps of 20,000 men, so great was the confidence with which he inspired his troops, and terror caused throughout Europe by his numerous and splendid victories.

Of all the moral influences bearing on warfare perhaps none is greater than religious frenzy or fanaticism. Those who have seen a charge of Ghazis will know what I mean. These men, believing that death at the hands of infidels (as they term all who differ with them in creed) opens to them the gates of the 7th Heaven—a heaven of exquisite materialism—intoxicate themselves with some drug, and then with flashing eyes and frenzied yells of *Allah, Allah!* rush on to certain destruction with a fury that has about it something diabolical. There are no more difficult adversaries to deal with than those, like the Ghazis, who court death.

During the Cábul campaign of 1879 an incident occurred which will serve to illustrate religious frenzy.

On the 12th of December a force under General Baker was employed in clearing the enemy off the Takht-i-Suleiman heights which dominate the city of Cábul. About half way up there was a plateau in front of the 92d Highlanders. When the regiment reached this comparatively easy bit of ground after their stiff climb, they instinctively pulled up to take breath. Suddenly, with a wild yell, several hundred Ghazis leaped over a line of stone breastwork behind which they had been hiding, and charged the Highlanders. The moment was a critical one. The men were out of breath and exhausted by climbing. The enemy rushing down the slope on them with the force of a torrent seemed as if they must sweep them over the precipice.

For a moment the Highlanders wavered. Then Captain Dick Cunyngham stood forth and called on them to remember some famous battle borne on their colors; the effect was magical; the Highlanders sprang forward as one man, meeting charge with charge, and the result was that not a single Ghazi survived to tell the tale.

For this Dick Cunyngham received a well-earned Victoria Cross. Now here we have no less than five moral influences exemplified in this one incident.

1. *Surprise.*—There is something in the suddenness of an unexpected catastrophe which seems for a moment to paralyze the mental and physical powers, and to render men temporarily helpless. This we shall presently consider.

2. *Religious Frenzy.*

3. The influence of the example of one brave and cool-headed man on wavering troops.

4. *Esprit-de-Corps.*—To which the leader appealed, and not in vain, and—

5. The vigorous forward impulse which counter-offense always gives to troops who have suffered a check or reverse. This is frequently far more effective than the assumption of the initiative, because in the actual fight men's blood is hotter and their nervous tension greater than at the commencement of hostilities.

Like the Ghazis, are the Egyptian Dervishes with whom our troops may have to engage before long. They display the same reckless bravery, have the same powerful physique, but are better armed than the Cábulis and have, perhaps, more skill in the use of their weapons, and it is important that we should know how to meet such attacks and with what we may overcome the demoralization naturally caused by the furious onslaughts of fanaticism.

Let us look for the weak joint in this armor—and this is easily found. A man under the influence of frenzy or intoxication is powerful only for attack. The very impulses which drive him forward tend to destroy in him the capability for defense. He will hack and thrust, but he cannot parry: he will brave every danger, but he is incapable of utilizing the great principle of union which makes all military force. What then must we oppose to these human avalanches?

Should we, like Cunyngham's Highlanders, meet charge with charge and attack with attack? I think not. In this case he had the advantage of numbers; in Egypt it will not be so, and for men like these in search of death, no attack will have any terrors. We should rather I think make use of just those qualities in which our adversaries will be deficient, coolness, presence of mind—cohesion—quick and steady shooting.

A calm defensive rôle should be our aim. Let us meet their charge as the rock meets the fury of the wave, inflexible, unflinching,—taking every advantage of our superior armament, our superior discipline, and the moral strength of union conveyed in the good old phrase "shoulder to shoulder."

The next influence I shall mention is surprise. This has always been a powerful factor in war, and is one which we should strive to utilize to the utmost, while carefully guarding against its employment by our foes.

As we have seen, the result of surprise on troops is a sort of moral and physical paralysis, and it will depend at critical moments on the quality of the troops themselves, and the mental balance and readiness of resource of their leaders, if this does not at times degenerate into a panic and flight.

Many wonderful feats of arms have been achieved by means of this moral influence. Let me here give you one or two examples.

In the Peninsula in 1809, by means of a surprise, Sir Arthur Wellesley drove Soult out of Oporto and eventually out of Portugal.

Soult with 20,000 men had captured Oporto. Fearing little from the English, and contenting himself with observing the movements of their fleet, he gave all his attention to the civil administration of the conquered district; and so well did he succeed in conciliating the Portuguese that they offered him the crown. Soult seems to have taken kindly to this idea of a kingdom, but all his officers did not, and the result was a plot to arrest him and carry him back to France. This conspiracy was widespread in the French ranks, and greatly weakened Soult's authority. His orders were either badly executed or entirely neglected, and this probably accounts for the want of military precaution and vigilance displayed by the French on this occasion, for Soult himself was a master of the art of war.

Just a fortnight after the capture of Oporto Sir Arthur Wellesley arrived on the scene with an English force and occupied the suburb of Villa Nova, opposite the town on the left bank of the Douro, while Beresford with his Portuguese Legion crossed higher up the river at Lamego so as to intercept the French retreat in the direction of Salamanca. Soult was in Oporto, on the right bank. He had destroyed all the bridges and taken over with him all the boats, and had crowned the rocky heights above the city with 200 guns. Immediately on his arrival, Wellesley proceeded to reconnoitre from the top of Mount Serra, behind which his troops were massed. He noticed that the French had very few outposts above the town, and also that just opposite him on the other bank was a half-finished building surrounded by a walled enclosure large enough to contain 3 or 4 regiments.

This building was known as the New Seminary, and here the French had allowed to remain a number of large barges used for carrying timber and stone. Sir Arthur at once conceived the idea of a surprise, and the "factor unforeseen," to which I have alluded, favored him on this occasion, for a poor barber, anxious to rejoin his family on the left bank, managed to elude the somewhat slack vigilance of the French patrols, and crossed in a small boat. This Wellesley seized, and in it he sent over an officer and one or two men who detached and brought back three barges. In these a battalion of infantry crossed and took up their position in the enclosure, from whence the other boats were rapidly sent over, so that in an hour and a half there were 3 regiments in the middle of the French position. In the meanwhile the whole of Wellelsey's artillery was got into position on Mount Serra, and General Murray with a German brigade and the 14th Dragoons, moving up the left bank found a ford by which they crossed and moved down on the French flank.

The surprise was complete, and the English captured the town. To the credit of the French be it said that they quickly recovered themselves and fought well and bravely, retiring in good order, but none the less were they driven out of Oporto by an inferior force, and after a series of disastrous marches across the mountains, to accomplish which Soult had to destroy all his artillery, they recrossed the frontier and took refuge in Spain.

This is a curious example, and instructive as illustrating the power of surprise, for these soldiers of Soult's were old and hardened warriors who had served in many a campaign under Napoleon, and considered themselves invincible. It was owing to the admirable qualities of both officers and

men that the retreat to Amorante was conducted in such good order.

Another famous surprise occurred in the Russian campaign of 1812. You will remember that in the month of June that memorable year the "Grande Armée," 325,000 strong with nearly 1000 guns, was assembled on the banks of the Neimen.

To oppose this invasion the Russians had two armies in the field, while a third under Tormasoff was hastening back from Turkey, which country through the intervention of British diplomacy, had just concluded a peace with the Czar.

Napoleon's plan was to push forward towards Moscow with all speed so as to prevent the junction of the Russian 1st and 2d armies. In this, owing to the incapacity of his brother Jerome, he was unsuccessful, and on the 3d of August, Barclay de Tolly and Prince Bagration joined hands at Smolensko.

On the Russian right Wittgenstein was in command of a corps 30,000 strong against whom Marshal Oudinot was advancing with the 2d Corps, about 44,000 men. On the 30th and 31st of July there was hard fighting at Kliastitsoui, but without any decisive result. On the evening of the 31st Oudinot rather unnecessarily retired behind the river Drissa, which he had crossed in the morning, and bivouacked in a wood. There was but one ford over the Drissa, the banks of which are very steep and 15 or 20 feet high. At night-fall General Koulnieff, commanding the Russian advance guard of 8 battalions and 14 guns, very imprudently crossed over and bivouacked on the left bank within striking distance of 40,000 French.

The wood in the form of an arc embraced the ford, the river forming the chord, and on the two extremities of the arc the trees came down to the river bank, so that the Russians could not possibly have chosen a worse position. Their crossing was reported by the French videttes to General Legrand who was in command of the nearest troops, and he immediately formed a plan of surprise.

To this end he placed a regiment of cavalry under cover of the wood opposite the ford, and a regiment of infantry on either extremity of the arc —that is to say on either flank of the Russians—also under cover.

When all were in position, the signal for advance was given, and the cavalry moved forward very quietly at a walk. The Russians had no cavalry, and their few sentries were too close to their bivouac to be of much use in giving an alarm, so that Legrand hoped to be able to effectually surprise and capture them with little or no loss. Here however, as so often happens, the general's plan was frustrated by an unforeseen occurrence. A couple of Cossacks prowling about on their ponies in search of plunder, came on the French cavalry, and immediately fled at full speed to give the alarm. The French seeing they were discovered, at once charged, but before they could reach the Russian batteries, the guns had opened on them with case, at point-blank range, and 2 officers, 37 men, and 40 horses, were killed, but before the gunners could reload the Chasseurs were among them, sabring men and horses and throwing the Russian camp into the greatest disorder.

The French infantry on both flanks now charged with the bayonet which

decided the contest. Koulnieff was killed; 4000 men laid down their arms, and 2000 were either killed or wounded.

I have already said that directly well-disciplined troops have recovered from the first effects of a surprise, this is the psychological moment most favorable for counter-offence.

A remarkable instance of this occurred at Polotsk, about a fortnight after the affair of the ford of Sivotschina which I have just related.

On the 16th of August, Wittgenstein, who had been reinforced, and now had 60,000 men, advanced against Oudinot, who had also been reinforced by St. Cyr with the 6th Corps, making his total up to 52,000.

After a hard day's fighting, the advantage if anything remained with the Russians, though the French still retained possession of the town of Polotsk.

Wittgenstein had proved himself more than a match for Oudinot, who, however, was wounded in the evening and handed over command to St. Cyr.

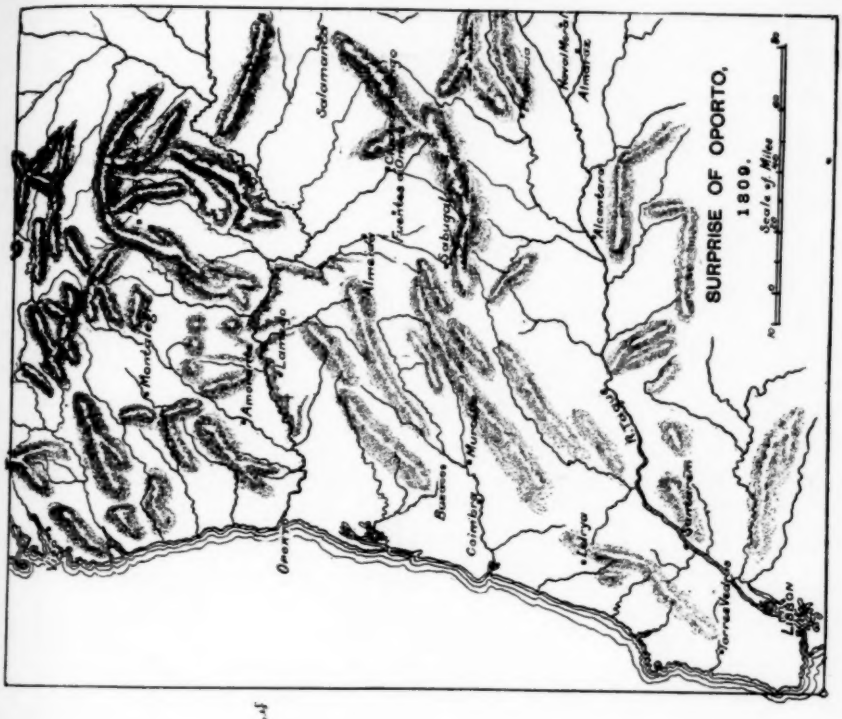
This was unfortunate for the Russians, for St. Cyr was one of the most capable commanders in Europe at that time.

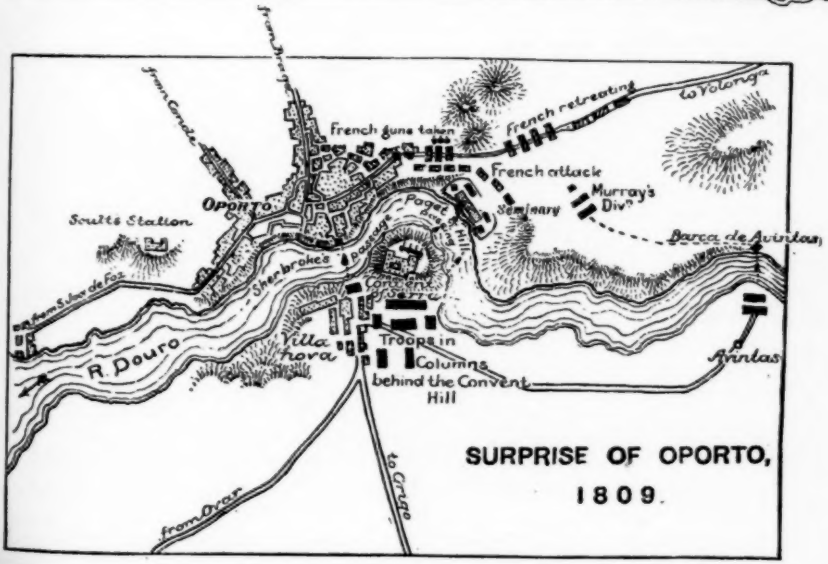
Expecting to be vigorously attacked in the morning, the French general spent the night in making preparations. He cleared the streets of the town, put the wounded into billets, and with empty casks and planks constructed a second bridge over the Dwina.

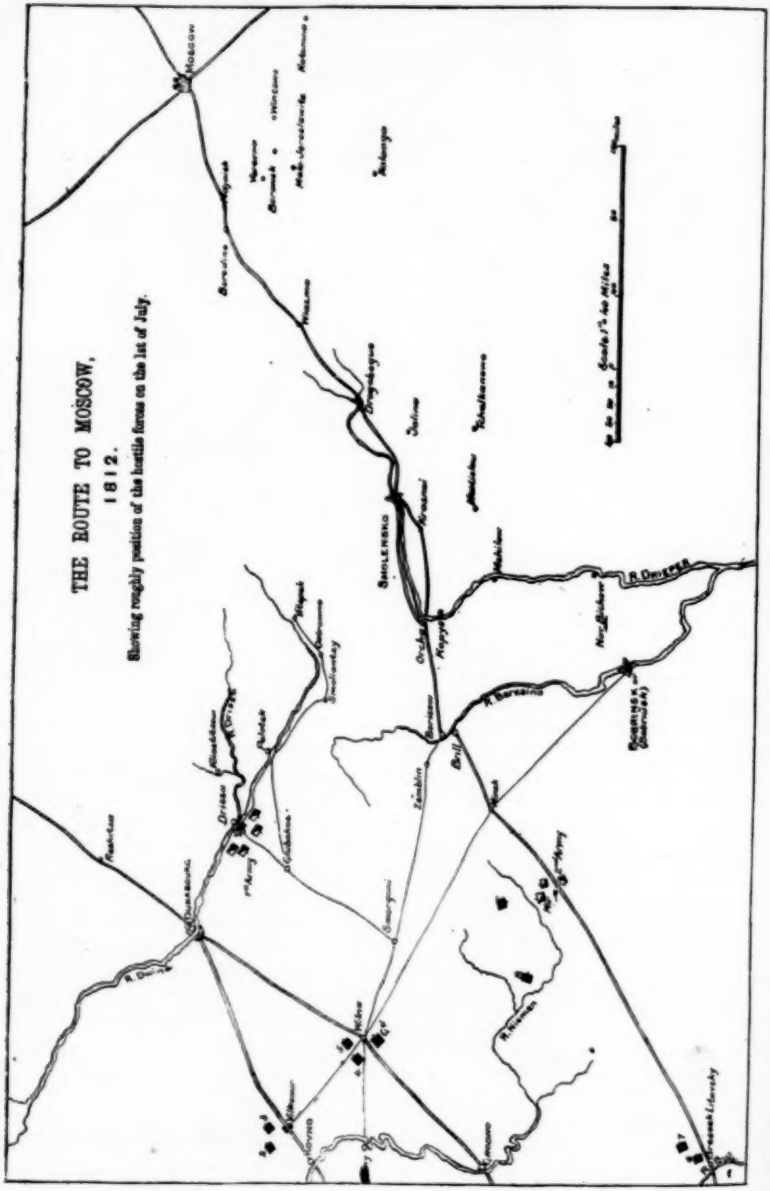
The morning came, but the Russians made no move. The Poles were friendly to the French and would have helped them openly had they dared. One of them got into the Russian camp and returned with the news that Wittgenstein was expecting large reinforcements.

St. Cyr now determined to attack before these could arrive, and planned a surprise. As his troops had suffered severely the day before, he fixed the hour of 6 P. M. for the action so that darkness might put a stop to the fight before it could become too serious. The greatest quiet was ordered along the line of outposts and in the town. No troops were to show till the signal gun. The cavalry was massed behind a faubourg on the left of Polotsk where they had in front a vast plain. The infantry was told off—two divisions to attack the Russian camp—one division to support the cavalry, and two divisions to guard the town and form the reserve. The artillery was placed under cover of the dilapidated earthworks which surrounded the town, so as to command the enemy's camp. At 6 o'clock the signal was given and the whole of the French artillery fired a general salvo. Immediately the leading divisions sprang forward and carried the gardens of the faubourg with a rush, pursuing the Russians into the midst of their camp where they captured some guns and numerous prisoners. This surprise, though made in broad daylight was so complete that Wittgenstein was surrounded when seated at dinner in a little chateau near his camp. Jumping out of a back window he managed to effect his escape on a Cossack pony.

The Russians, panic-stricken, fled in all directions without attempting to take up their arms; the confusion was indescribable. But just at this juncture there occurred one of those inexplicable accidents of war, so common and yet so extraordinary, that they seem to be supernatural, and we


SURPRISE OF OPORTO.
1809.
Scale of Miles
Salamonde
Almeida
Alcantara
Almaraz
Abrantes
Santarem
Thomar
Coimbra
Busaco
Lisbon
Torres Vedras


French guns taken
French retreating
to Volonga
French attack
Murray's Div.
Seminary
Oporto
Paget
Hill
Serra de Avintas
Soults Station
Sherbrooke
Portuguese
Battery
from Villa de Foz
R. Douro
Villa Nova
Troops in Columns behind the Convent Hill
Avintas
to Grijo
from Oliveira
SURPRISE OF OPORTO,
1809.


THE ROUTE TO MOSCOW,
1812.
Showing roughly position of the hostile forces on the 1st of July.
SMOLENSKO
R. Dnieper
R. Moskwa

can easily understand the ancients ascribing them to the personal intervention of the gods.

In rear of the Russian camp was bivouacked a single squadron of Horse Guards—a *corps d'elite* composed of young men of the best Russian families, all noble, and commanded by a major of distinguished courage.

These, being the pick of the troops, first recovered their mental balance, and were now in the happiest disposition for counter-offense.

The gallant major, mounting his 120 Cuirassiers, set off at full speed in

the direction of the French army. The first troops they attacked were the 26th Light Infantry, who easily repulsed this attack by a single squadron. Without giving them time to rally, the major, calling on his men to follow, set off at a gallop in the direction of Polotsk, and after him in loose order all that remained of the squadron. The plain across which they rode was covered with foot soldiers—Portuguese, Swiss, and Bavarians, the allies of the French. Some scattered by the effects of their victory, were trying to rally; others were carrying off the booty captured in the Russian camp; all

were in more or less disorder. The Russian Horse Guards having knocked over a few of these stragglers,—suddenly the whole mass was seized with one of those extraordinary and unaccountable panics which now and then occur in warfare. The confusion and flight became general. St. Cyr, who had taken refuge in the midst of the Swiss battalion, was bowled over, horse and all by the flying mass and had a narrow escape of his life. It is impossible to say what might not have been the result of this stampede had it not been for the prompt action of General Berckheim, who placing himself at the head of the 4th Cuirassiers, charged the Russians and killed or captured them all. Their gallant major was killed.

In this episode we have good examples of the moral influences of surprise and counter-offense. The Russians, wearied by their hard fight the day before and seeing no movement in the French camp till evening were lulled into a false repose: they were all resting or eating. Then came the sudden attack and complete demoralization of the Russians. Now, a handful of enterprising young nobles recover and assume the offensive. They attack French troops, in formation and fail; then, violating every rule of war, and intent only on giving their own side time to rally, they fly at the throat of a whole army corps, and (wonderful to relate) put the whole army corps to flight. This is a proof of what can be achieved by a handful of resolute cavalry acting suddenly and vigorously at the right moment.

Had the Russians been less demoralized; had they followed up this first success and launched their cavalry and infantry in the wake of this adventurous squadron, the result might well have been a crushing defeat for the French at Polotsk.

Surprise will always continue to be one of the most potent moral influences in war, and the qualities required to meet it are coolness, presence of mind and, at first, a vigorous defensive. The moment the troops recover from their first surprise they will be in the happiest disposition for counter-offense, and the moral impulse given by counter-offense is ever a powerful aid to victory.

We now come to one of the greatest of moral forces in a military sense —that of discipline. It is this that gives the trained soldier such an advantage over raw levies or untrained volunteers, though individually they may be equally brave and skilful in the use of arms.

To tell you what discipline has achieved in the annals of war would take more time than many lectures of the limits of this.

You that are soldiers know what discipline is. Its essence is implicit obedience, and intelligent subordination of will to the direction of those higher in authority; its strength lies in an unbroken chain of responsibility; its moral power is the quietness and confidence with which it inspires the soldier. Discipline is the very life-breath of armed masses. Without it we have but a crowd of men, food for powder; with it we have a highly organized and powerful machine, to whose capabilities there is practically no limit.

I can do no better here than quote for you some remarks made by Colonel (now Brigadier-General) Young at the conclusion of the last lecture I had the honor of delivering in this place.

XUM

"This multiplication of power (he says, speaking of discipline), for it is nothing else, is only obtained, like all other things worth having, by much thought and constant practice, and I do not think that at present it gets either one or the other, at all events in the way necessary. The power of discipline does not merely mean a power to keep men from running away when they would otherwise do so; it means much more than this, viz., a power to keep men from advancing when and where they are inclined, or from firing when and where they are inclined, and so on, which all requires a much higher power over them than one which merely keeps them from running away.

"It is in fact the power, when their whole natural inclination impels them to do a certain thing or go in a certain direction, to cause them to do just the reverse; to halt or turn aside when they are wild to rush onwards; or to remain silent under a withering fire without firing a shot in reply. * * * The man has got to acquire a habit, one which is strange to every feeling of all his previous existence, a habit of absolute, unquestioning, instant subordination of his will to the perhaps apparently erroneous will of another."

Again, Major V. Hoenig, in his "Tactics of the Future," speaking of what he terms the psychological element, says: "The factors which formerly animated the general himself—emulation, ambition, the desire for honor and glory, enthusiasm for the cause of the war, etc., must nowadays extend to all ranks, indeed permeate the whole machine, so to speak; and this moral factor must be fostered by an iron discipline—a discipline of the ancient Romans or Frederick the Great, otherwise the best rules and regulations are useless."

An excellent example of what discipline can accomplish is afforded by Napoleon's passage of the Landgrafenberg on the night of the 13th of October, 1806.

The French army was at Jena, which is dominated by a very steep rocky height, called the Landgrafenberg. The Prussian and Saxon armies were on the plain beyond. They believed that the only route by which Napoleon could reach them was the Weimar road, which passes through the Mühlthal, a long and difficult defile which they had strongly guarded.

The Elector of Saxony had been compelled by the King of Prussia to join him in arms, but the Prussians were detested by the Saxon people, and so it was that, exasperated by the flames which were devouring the town, a Saxon priest offered to show the Emperor a way over the Landgrafenberg.

This he did, a narrow pathway, but from the top the great captain noticed that half way down the other side there was a sort of rocky plateau or ledge capable of holding a considerable body of troops if closely packed, and this he determined to use as a citadel, from which in the morning to attack the Prussians.

Ordering up four thousand pioneer tools from his engineering park, he set his troops to work—one battalion at a time for an hour—to enlarge and improve the road.

Each battalion, on being relieved, was to move on in the dark in perfect silence and take up its position on the plateau.

The work was carried on all night by the light of torches which were

XUM

BATTLE OF JENA.
14th October 1806.
JENA.
Romstedt
Vierzehn Heiligen
Isserstadt
4
5
6
7

unnoticed by the enemy owing to the flames of the burning town, and so it happened that by day-break there were 40,000 men massed on the Landgrafenberg. So closely were they packed that the chest of every soldier touched the back of the man in front of him, and so perfect was their discipline that the men stood, each in his place, all night without sleep or rest, and without the slightest sound, for all this was carried on within half cannon range—about 600 yards—of the Prussian camp. At day-break, under cover of a favorable fog, they were able to debouch from the ledge and form in order of battle on the plain beyond without the knowledge of the enemy. The result was a well-deserved victory for the French.

Next to discipline, I would put *esprit de corps* as a moral factor of inestimable value. The greatest of all leaders, Napoleon, knew the worth of this spirit, and how to foster it in his army where it attained to the highest perfection. Teach the soldier that he belongs to the finest regiment in the world, and impress on him that his particular company or squadron should be the best and most distinguished for valor and good behavior in the regiment, and that he himself should be the most distinguished man in his company, and such teaching cannot fail to have a good effect.

To this end it is that badges and buttons, facings and trappings, are ordained—to give them a pride in their uniform, and in my humble judgment it is a serious mistake to take away from a regiment anything in which the men have taken a pride in the past, be this their time-honored numbers, their buttons, their facings—what you will.

All these things help to foster the spirit of the corps, and this is a spirit that has performed many a miracle on the battle-field. In describing an attack by his regiment, the 23d Chasseurs, on the Russian infantry at Kliastitsoui in 1812, Baron Marbot says: "This charge was executed with all the more resolution and vigor because, in addition to their habitual courage, my men were stimulated in the highest degree by the thought that their comrades of the 24th were looking on." That was *esprit de corps*, and the result of that charge was the complete rout of the Russians.

I have mentioned confidence in their leaders as a powerful moral influence with troops. This of course to a great extent will depend on the qualities of the leaders themselves. Great generals like Charles the XIIth, Frederick the Great, Napoleon, or Wellington have inspired their soldiers with unbounded confidence.

In the affair of the Landgrafenberg it was not only discipline, but implicit confidence in Napoleon which enabled the French troops to accomplish their wonderful achievement, and a tale is told of his marvellous influence—an incident which occurred during the battle of Essling, which is worthy of repetition.

On the first day of Essling, the Austrians had captured the village of that name and the French regiment that had formed the garrison were driven out before a very superior force and their colonel killed.

This was reported to Napoleon, who seeing the importance of the position and having no reinforcements at hand, galloped himself up to the battalion which was reforming outside the hamlet under a hail of bullets, and demanded—"Where is your colonel?" "He has just been killed," was the

reply. "I did not ask," said the Emperor, "If he were alive but where he was." Then a timid voice explained that his body had been left in the village. "What, soldiers," cried Napoleon, "you have abandoned your colonel to the enemy! Know that a brave regiment should always be able to show its colors and its colonel, dead or alive. You have left yours in the village: go and fetch him here!" The regiment with a great cry of *Vive l'Empereur!* charged and recaptured Essling, which they held for the rest of the day.

Such was the magic influence which the presence of, and a few words from Napoleon always exercised on his troops, nerving them to face the greatest dangers and accomplish the most difficult tasks.

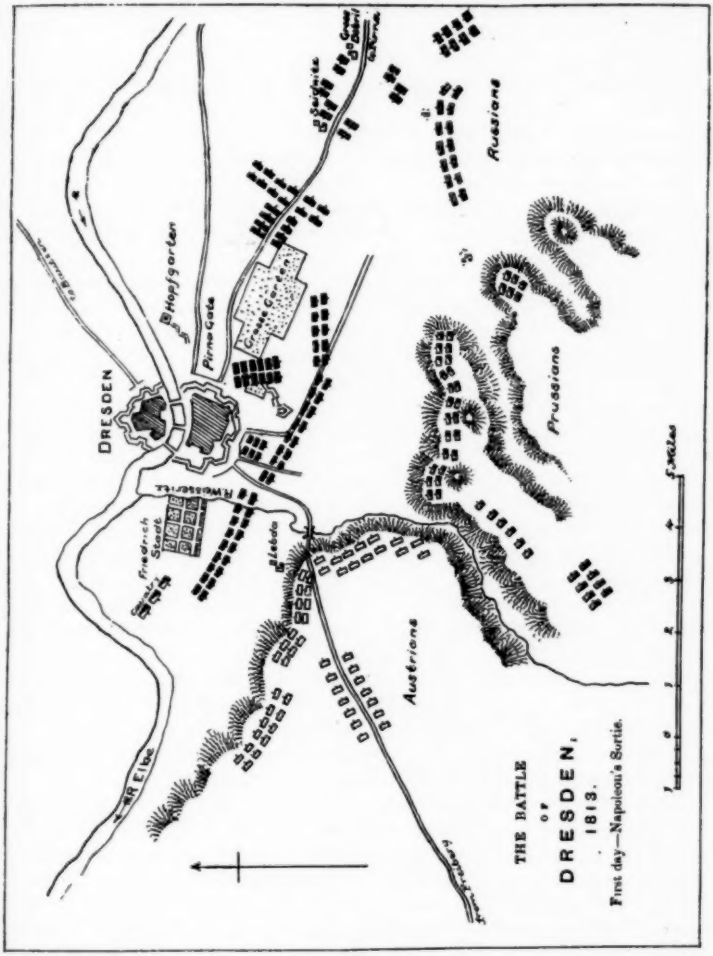
On the other hand, great leaders have inspired their enemies with fear and terror, and this moral influence has ofttimes turned the scale of victory.

When Junot in 1807 made his audacious raid on Lisbon with only 4000 men, so great was the terror which the victories of Napoleon had spread over the continent of Europe, that although Lisbon had a garrison of 15,000 men and that a powerful English fleet lay in the mouth of the Tagus, the Portuguese government hastened to accede to all the demands of the Emperor, and actually offered to declare war against England in the hope of arresting Junot's invasion. And when this had no effect, on his nearer approach, the Regent, the Queen, the royal family, all the nobles and some 10,000 of the inhabitants set sail for Brazil and abandoned their country. Junot actually entered Lisbon at the head of barely 1500 men.

But these were cowardly Portuguese—you may say. Well, one more instance; the battle of Dresden, 1813.

In August that year Marshal St. Cyr, the same whom we saw fighting against Wittgenstein at Polotsk, was shut up in Dresden with 17,000 men. Against him was marching an allied army of Austrians, Prussians, and Russians 200,000 strong under Prince Schwartzenberg. On the 23d Napoleon was at Lowenberg, a small town half way between Bautzen and Breslau. Here he had news of St. Cyr's danger, and leaving Macdonald in command, the Emperor himself with the whole of the Guard, a corps of cavalry and another of infantry, set out the same afternoon by forced marches for Dresden. The distance was 90 miles and yet this large force was in Dresden on the afternoon of the 26th, a wonderful march and most fortunate, for Napoleon arrived in the capital just before the advanced troops of Prince Schwartzenberg appeared on the other side of the town. Thinking they had only St. Cyr to deal with, and seeing that the defenses of Dresden were of the weakest, the Allies advanced to the assault with such impetuosity that they carried all before them, taking several out-works and occupying the faubourg of Pirna. They had reached the walls of the town and were battering at the Freyberg gate, when suddenly, by command of the Emperor, the gate was thrown wide open, and there, issuing at the "double" appeared a column of the infantry of the Imperial Guard. The effect was magical. The Imperial Guard meant Napoleon, and Napoleon meant the Devil! At the first sight of the bear-skin caps the assailants turned and fled in wild confusion, abandoning the whole of their artillery and the redoubts they had just taken.

From four other gates a similar sortie was made by the Guard simultaneously and the Allies were completely routed, losing that evening some 8000 men. The battle raged for two days, but I have not time to describe it. The second day the Allies lost 40,000 men of whom 20,000 were made



prisoners, but this episode of the Guard at the gate illustrates the moral power—the terror of Napoleon's name.

Superiority of armament is a physical or material influence in war, carrying with it a corresponding moral influence, favorable to the side possessed of it and detrimental to their adversaries. In the war of 1866 the

superiority of the needle-gun affected morally and materially the result of the campaign.

But I must warn you that certain factors in warfare have been accredited with undue weight by the unthinking crowd, and this is one of them. It does not always follow that the best armed side will win, and it behooves the military student to discriminate between the true and fictitious value of any such factors. Take for example, the case of sword *versus* lance.

A regiment of Hussars opposed to one of Lancers, might well feel they had little chance of success, and that of a certainty the whole of their front rank must be impaled on the formidable arm opposed to them before they could arrive within striking distance with the sword.

But there are many instances in military history to prove that the lance is not always victorious, and also that once the shock has taken place, the swordsmen have considerable advantage which increases in proportion to the length of their adversaries' lances.

Officers of light cavalry would do well to rehearse such contests to their men, as this would to great extent tend to discount the pernicious moral effect of the fear of the lance, which if allowed to exercise its full force might cause them to shirk the shock of combat.

Here is one such instance out of many.

You remember the battle of Polotsk, and how a single squadron of horse-guards caused a panic and flight in the ranks of the victorious French, and how General St. Cyr was overthrown by the flying masses. Well, St. Cyr was picked up by Berckheim's Cuirassiers and re-mounted. He promptly ordered up his two reserve divisions and vigorously attacked the Russians before they had recovered from their confusion, and defeated them.

While this was going on, the cavalry on both sides had become engaged on the Russian right.

The French had moved out into the plain with two regiments in first line, three in the second, and one in reserve. General Castex led with the 23d and 24th Chasseurs.

The Russian first line was also composed of two regiments, of which opposed to the 23d were the Cossacks of the Guard. This was a *corps d'elite*, and was considered the finest regiment in the Russian army.

They were dressed in scarlet, all picked men of great stature and were armed with lances 14 feet long.

They were, moreover, splendidly mounted, and as they had only just arrived and had not been engaged, their horses were fresh and in good condition. On the "charge" sounding the 23d with unflinching valor charged knee to knee against the Cossacks. The shock was tremendous, but once it had occurred all the advantage of weapons was with the swordsmen, who almost destroyed the Russian regiment and captured a number of excellent horses. In this encounter the 23d had only 8 or 9 men killed and thirty wounded.

The assumption of the initiative has always carried with it a certain moral feeling of confidence and enthusiasm which pervades the attacking side. But it must not be accepted as an invariable rule that to attack first is always advisable.

In war there are no fixed rules, and only a few fixed axioms.

When opposed to Asiatic enemies, the prompt initiative has always proved the winning move—witness the campaigns of Clive and Wellington in India—the capture of Arcot, the battle of Assaye—but where our forces are greatly outnumbered and the enemy is European, it will frequently be prudent to sacrifice this moral advantage for a greater tactical one—that of grasping the enemy's plan of attack and thereupon devising a counter-scheme which may enable us to overthrow him. Under certain circumstances the initiative is imperative and must be promptly seized or all is lost.

An example of this occurred in 1813 when two hostile advanced guards met in the defile of Glenhausen.

Napoleon was making one of his rapid marches, his objective being Hasenau.

His advanced guard, composed of cavalry unsupported, was engaged in the long defile of Glenhausen, a rock-hewn road bordering the Kinizig river. Here there was scarcely room in the widest part for 12 horses abreast. In this narrow defile they were met by Ott's regiment of Austrian Hussars.

The French commander promptly took the initiative and charged, throwing the leading Austrian sections in confusion on those in the rear. The Austrians turned and fired, pursued by the French. The pursuit lasted an hour and Ott lost 200 men, while not a single Frenchman was even wounded.

Artillery fire has always exercised a strong moral influence against troops exposed to it, while giving confidence and a forward impulse to its own side. The moral effect of artillery is estimated to be greater than its actual material value, and this is especially the case with horse artillery in a cavalry action.

The best way to overcome the natural demoralization consequent on artillery fire seems to me to be to familiarize the troops with those instances in military history where foreign armies have endured the most terrible cannonade without flinching—as the French at Essling or Wagram, and then how our own troops have stood against their fire, as at Talavera or Waterloo. Such tales cannot fail to stir in the hearts of our soldiery a spirit of emulation and a desire to imitate in their turn the fortitude displayed by their fathers.

A curious example of the moral effect of artillery is to be found in the history of the battle of Dresden. On the second day of the battle it poured torrents of rain, and towards evening a division of Cuirassiers under General Bourdesoulle drew up before a strong division of Austrian infantry in square.

Bourdesoulle summoned the Austrians to surrender, as their flint-locks being soaked with rain, they were unable to fire a shot. The Austrian general demurred, observing that as the French horses were up to their hocks in mud, and could not move out of a walk, he was more than a match for them with the bayonet.

"I will destroy you with my artillery," said the Frenchman. "You

haven't got any," replied the Austrian—"they are all stuck in the mud." "If I show you guns behind my leading regiment, will you surrender?" demanded Bourdesoulle. "Certainly," replied the other—"if you can." The French general then advanced with no little difficulty a battery of six guns to within 30 paces of the square, and the Austrian division laid down their arms.

An instance of the moral support afforded infantry by the enterprise of their own artillery will be found in the study of the battle of Königgrätz in 1866. The 57th Prussian regiment was advancing against the wood of Britz, strongly held by the Austrians. Their advance was slow and might at one time have come to a halt under the withering fire of the defenders, when Captain Schmeltzer, commanding a battery in the rear, mounting his detachments on the carriages and limbers, galloped through the skirmishers and unlimbered within 400 paces of the enemy's position. His loud word of command, "Action front; at 400 paces, with case, load!" was heard as far back as the second line, and the enthusiasm of the troops was raised to the highest pitch, so that with a rush they carried the position.

The moral effect of attacks by cavalry on infantry has always been greater than their actual physical value.

Infantry armed with modern weapons, if they are cool and unflurried, have little to fear from cavalry; but occasions will occur when they are broken and disordered, as after an assault, or when their ammunition is spent, or when they are tired and worn-out by marching, fighting, and fasting, when infantry will still be a prey to enterprising cavalry, so that its moral effect is still potent, though not perhaps to the extent it was in the wars of Napoleon. In the fierce battle between the French and Russians at the passage of the Beresina during the retreat from Moscow, the 7th French Cuirassiers charged a Russian infantry column, cut it in two, and took 2000 prisoners. Such an incident is not likely to occur to-day. At Mars-la-Tour six Prussian squadrons charged the French artillery in action, rode through the batteries and then rode over a line of infantry, but their loss was exceedingly heavy, and the more so as the survivors after the charge were overwhelmed by the French cavalry. Roughly the losses of the Prussians in this charge were 64 per cent. of the officers and 83 per cent. of the rank and file. But if cavalry attacks in front were, and are still demoralizing to infantry, much greater is their effect when delivered on the flanks or in rear; and against their own arm, cavalry has always endeavored to assail these points.

There is a common saying, that in cavalry actions one man in rear is equal to ten in front. The great difficulty, however, has always been that bodies of cavalry attempting to gain the flanks and rear of an enemy in so doing expose their own flank and rear. It is for this reason that flank attacks by large bodies of cavalry have seldom succeeded against a well-led foe.

An example of the failure of a flank attack delivered under the most favorable conditions, will be found in Marbot's description of the cavalry action at the Katzbach in 1813.

Excelmans' division had passed over the Katzbach, and was moving

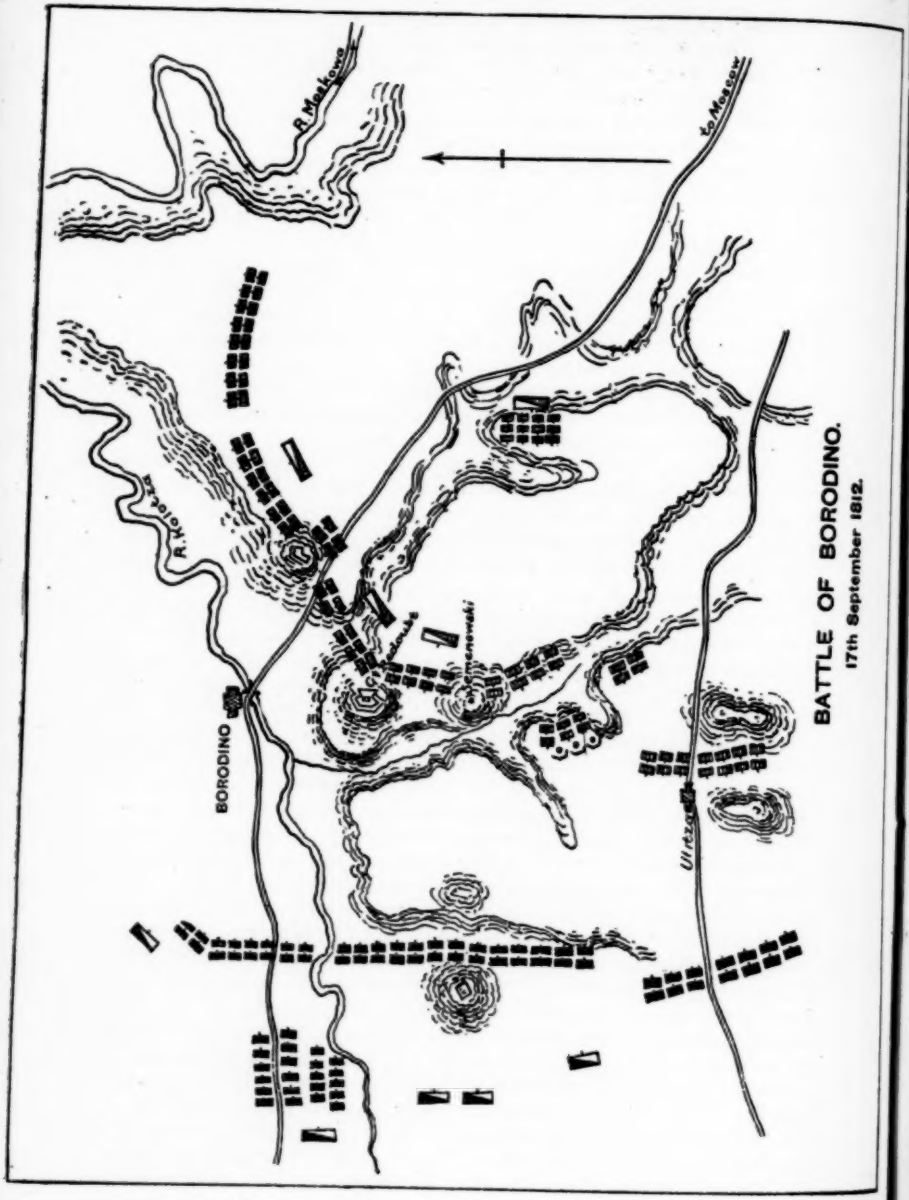
across the vast plateau of Jauer, in line of brigade columns at 500 paces interval. There was no enemy in sight, but on the French right, about 1000 paces distant there was a thick wood. Excelmans had left his command and had galloped back to inquire why Marshal Sebastiani had taken away his horse artillery, about which he was very angry, and had left his troops without orders and without any scouts out. In those days scouts were only sent out by order of the divisional general, and though Colonel Marbot had a strong suspicion that the wood was occupied, he did not dare to explore it without orders. The right brigade column consisted of the 23d and 24th Chasseurs and the 11th Hussars in this order. Suddenly, out of the wood on the right rear of the French, issued three regiments of Prussian Lancers in line, who with loud hurrahs charged the French column in flank. The 11th and 24th, taken by surprise, were thrown into great disorder, but Marbot with his habitual coolness ordered line to the right at a gallop—a difficult manœuvre in those days of pivots, and this was so well and quickly executed that they were in time to meet the enemy in good order. Moreover, the Prussians coming up from the right rear, exposed their left flank, and on this the 23d caught them and rolled them up. The 11th Hussars, a Dutch regiment, ran away, but the 24th quickly rallying came to Marbot's assistance and completely routed the Prussian Lancers. Here with every element of success in their favor the flank attack failed, they exposed their own flank and were defeated. Of course this is only an episode in the battle of the Katzbach in which the French were badly beaten.

Cavalry attacks in rear are the most demoralizing of all. A curious and unique instance of this occurred during the battle of Borodino in 1812.

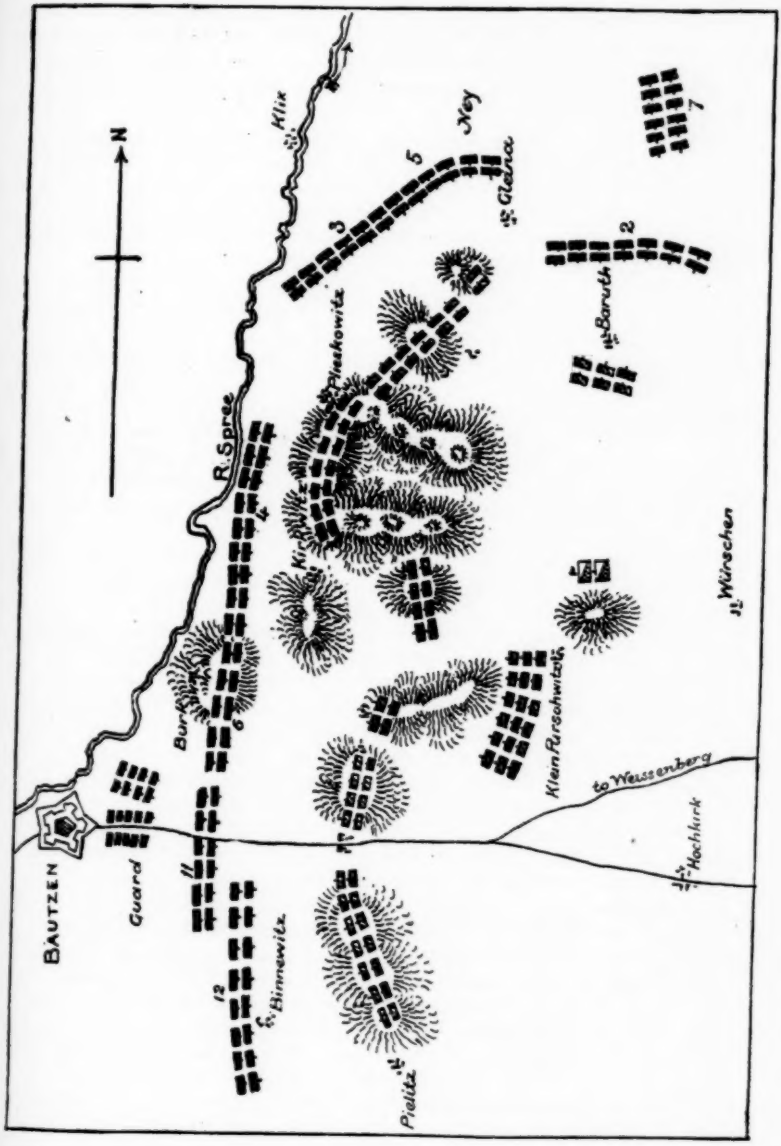
The Russian position was along a line of heights strengthened by field works—redoubts and redans, the strongest of which was a fort armed with 80 guns and known as the "Great Redoubt."

All these works were carried by the French, but the Russian Guard recaptured the Great Redoubt. General Montbrun observing that the redoubt had an open gorge and that the line of heights could be turned in flank, proposed to the Emperor to attack it in rear with his cavalry division, while the 4th Corps, assisted by the fire of 200 guns, assaulted it in front. Napoleon approved of this daring scheme, but while giving instructions to his brigadiers, Montbrun was killed by a round shot. The Emperor now appointed General Caulaincourt to succeed Montbrun, and he, turning the position, overthrew the Russian cavalry and attacked the redoubt in rear with his Cuirassiers, penetrating into the interior where he fell shot through the head. The Russians paralyzed by this unexpected attack in rear, fell an easy prey to the French cavalry, although they were several battalions strong with a numerous artillery force, and the Cuirassiers, by way of avenging the fall of their leader, killed the greater part of them and remained in possession of the fort, a feat of arms that decided the day in favor of the French.

The moral effect of attacks in flank or rear applies equally to infantry, but in a somewhat lesser degree, as the more rapid evolutions of cavalry bring the additional moral influence of surprise to aid that of the indirect



BATTLE OF BORODINO.
17th September 1812.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Klix
Hey
Glaca
Baruth
Plieskowitz
R. Spree
Kreckwitz
Burk
Würschen
Klein Förstchwitsch
to Weissenberg
Hochkirk
BAUTZEN
Guard
Binnewitz
Pleitz
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attack. What I have said, too, about the difficulties attending such attacks, also applies.

On the 30th of July, 1812, Wittgenstein drew his army off the route to St. Petersburg in order to fall on the left flank and rear of Oudinot's corps at Kliastitsoui, and in so doing exposed his own right flank to the French attack, and moreover laid open his line of communications. The French were victorious that day, and if Oudinot had been possessed of more dash and less of that ultra caution which marred his fame as a general, if he had only pushed boldly on that night, he might have cut off the Russian line of retreat, and St. Cyr coming up with the 6th Corps, and Macdonald, who had just taken Dunabourg, closing in on their rear, they would have been surrounded and would probably have surrendered.

A glance at the map of the battle of Bautzen, which is a good example of a successful flank attack, will make plain what this exposure of the attacking army's flank means.

Napoleon at Bautzen had nearly twice as many men as the Allies, and could spare 60,000 for the flank attack under Ney, while opposing an equal number to the enemy in front. The allied Russian and Prussian army was in a strong entrenched position, and the battle lasted two days. On the evening of the first day the French turning movement was clearly seen by Barclay de Tolly from the heights above Gleina, and had he been a better general, he might easily have devised some counter scheme to oppose it. Had he, for instance, during the night retired the whole of the Guard to Wurschen, and then taken a northerly direction for five or six miles, by daybreak he would have had 24,000 men on Ney's flank while Kleist held them in front at Bayruth. Moreover, of the Guard, 8000 were heavy cavalry which would have been of the greatest value, as Napoleon had no cavalry on this occasion. As it was, it proved a dearly-bought victory for the French, for it cost them 25,000 men, while the Allies' loss was but 15,000. Moreover the Allies, covered by their cavalry, retired in good order by Hochkirk and Weissenberg, so that beyond forcing them to retreat the French really got the worst of the engagement.

Flank attacks, therefore, are not really so formidable as they seem: good generalship should usually enable us to defeat them.

Hitherto the fear of being outflanked has, I think, unduly weighed with military leaders, and has been allowed to exercise a spurious moral influence which a closer study of the annals of war would do much to discount in value.

But what is the practical lesson to be learnt from the whole subject?—for that, after all, is what concerns us most. I think it is this—that certain moral influences in war are so powerful for good or evil, that in our military training they should by no means be neglected, or lost sight of. Of these, some are only to be mastered in times of peace—on the parade ground, in the lecture room, on the range. Such are discipline, which, as we have seen, is a slowly acquired habit formed by constant practise, and *esprit de corps*, about which I shall have a few more words to say. The first of these in our army is not what it ought to be if we are to hold our own against all comers. We have sensibly deteriorated in our discipline since

the days of Wellington. A long peace (save for minor wars) of forty years has, I fear, caused us to lose sight of the incalculable importance of this great moral force. What must we do then? It is not for me to say. Reforms must come from above—from the very highest authority. There is, however, one suggestion that I would venture to throw out, and that is, that it seems to me advisable in the interests of discipline to take away from general officers commanding divisions and districts in this country the power of mitigating the sentence of a court-martial. I am convinced that if this were done, and this power vested only in the Commander-in-chief for general courts-martial, and lieutenant-generals commanding army corps for all others, it would be a step in the right direction. At present there is too much mitigation, and this is to the detriment of discipline, if it does not directly encourage crime. It must be clearly borne in mind that there are two kinds of discipline. One is the slavish discipline of fear, the discipline of the circus horse or the performing dog. This has been found necessary in the past when great numbers of ignorant and boorish conscripts had to be drilled and made into a fighting machine. It was no use appealing to their intelligence—they had none—so fear was made the master force.

Very terrible were the punishments of Frederick the Great, and in 1812 even this baser sort of discipline had wonderful results in the Russian ranks; but what we require is a far higher moral standard, a discipline of intelligence and knowledge. Each soldier in our ranks should be taught that he, individually, has an important part to play and that it is by his prompt and implicit obedience to orders that the whole war machine is to be brought to the highest pitch of perfection. There is no discipline without punishment, but the praise of well doing should be a far greater incentive to the good soldier, than slavish terror to the bad.

The second of these influences, *esprit de corps*, we seem rather to discourage in our army than otherwise, and, believe me, this is a great mistake. Discipline steels men for defense and teaches them to follow their leaders into danger, but it is *esprit de corps* that gives us volunteers for the forlorn hope,—deeds of heroism, good conduct, sobriety, good shooting, proficiency in military exercises.

So great a factor do I deem this moral influence on the well-being and efficiency of an army, that I would put it no whit behind discipline itself. I would bracket these two together—discipline and *esprit de corps*.

When has the world ever seen soldiers more valiant than those veterans of Napoleon's—the heroes of Austerlitz—Jena—Friedland—and Essling? And what was the moral influence which nerved them to the accomplishment of deeds over which we are wondering still to-day? Patriotism?—Love of fame and glory?—Personal devotion to their Emperor?—Discipline? No; it was none of these, though doubtless each had its moral value in degree,—it was *esprit de corps*. Napoleon recognized the vital importance of this spirit and knew how to foster it. He knew the value of badges and buttons, bits of ribbon, pompons on shakos, Eagles and regimental colors—in short, all the invaluable trifles which we to-day in our short-sightedness have thrown away. His soldiers were, by his orders, so

carefully instructed in the history and annals of their own regiments, that not a man but could tell the name of every colonel since the battalion was raised—of every action it had ever taken part in—of every *sous officier* promoted on the field. We would do well, I am persuaded, if we, as a military nation, devoted our best attention to the revival of this great moral force in the ranks of our army, and to this end in every regiment and every garrison selected officers should be detailed to lecture to the troops. By means of illustrations with the lime-light, maps, etc., these lectures might be made as attractive to the men as theatricals or concerts, and would be of the greatest value in fanning the dying embers of the military spirit that once pervaded England.

Our regiments should be made familiar with their history. They should be taught to emulate the brave deeds of those who have passed away from their ranks, but whose fame and glory still shed a halo round the colors of the corps. The anniversaries of great victories should be religiously kept as military holidays, and no effort should be wanting on the part of our officers to stimulate this most important moral element.

The other influences we have considered belong more essentially to the province of the battle-field, and much may be learned by practice during peace manœuvres.

Let me give you one example. We have seen the moral value of surprise, and of attacks in rear. These, taken together, are specially applicable to cavalry combats, because in infantry fights the movements of the troops must of necessity be slow, and unless under exceptional circumstances, like those of Austerlitz, it will always be difficult for them to surprise a vigilant enemy or take them in rear.

But with cavalry it is not so. They should aim at surprises at all times, and never neglect an opportunity for attacks on the rear of their adversaries. Such attacks will be most effective when delivered immediately after the shock of the opposing lines, and to carry them out special bodies of troops should be provided. Take, for example, the case of a brigade of three regiments in the attacking line. Instead of the old fashioned and useless "succor squadrons" in rear, let us have three "surprise squadrons" following in rear of the flanks of the centre regiment and on the exposed flank.

On the "gallop" sounding, let the brigade advance in double echelon of regiments at half distance. When 150 yards from the enemy's line, the centre regiment charges, and a few seconds later the two refused regiments likewise charge, the independent squadron, however, making no alteration in their pace. On the final shock, the brigade will still remain in a double echelon, and this is the favorable moment for an attack on the enemy's rear. This will be carried out by the "surprise squadrons," each field troop acting independently and falling on the rear of a hostile squadron.

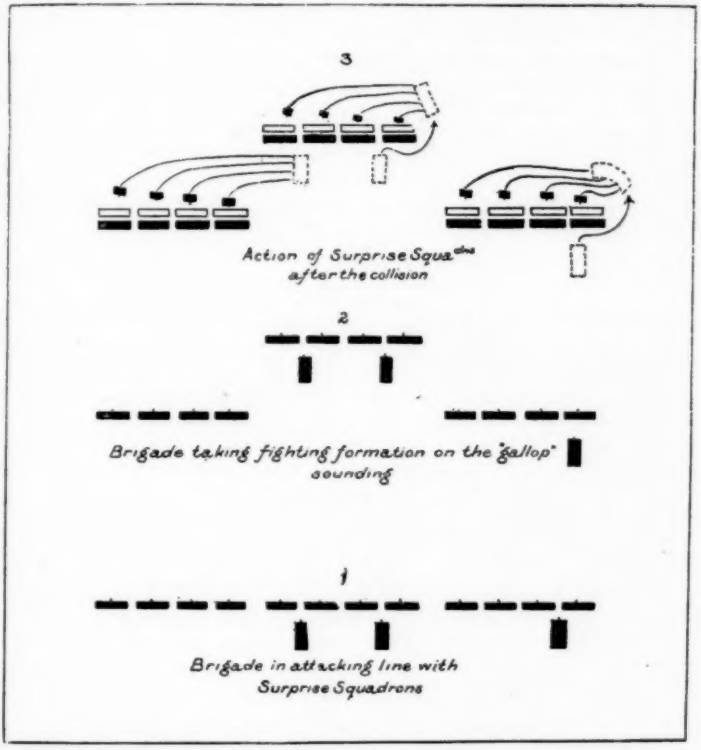
This is one example out of many I could give you of how we might practice the utilization of moral influences at peace manœuvres, and thereby accustom ourselves to make them serve our ends in war.

In conclusion, while striving to utilize to our advantage every moral element of success, we must not neglect to teach our troops rightly to esti-

mate those adverse influences which tend to demoralization and defeat, and how to defeat and overcome them.

This belongs to the province of the lecture room, a province the borders of which I should like to see greatly enlarged.

Ignorant and ill-disciplined troops are always liable to faint heartedness during a retreat, or when obliged to act on the defensive, and this demoralization is very apt to degenerate into a panic. But take the example of a skilful swordsman. He is often forced to fight on the defensive when


3
Action of Surprise Squadrons after the collision
2
Brigade taking fighting formation on the "gallop" sounding
1
Brigade in attacking line with Surprise Squadrons

opposed to an adversary of equal skill who attacks vigorously; but is he dismayed?—has he any idea of seeking safety in flight? Never!—and why?—because he is a master of his art. The fact of his having met his equal and perhaps superior in fence, only makes him more cool, more wary, more self-possessed.

Exercising all his skill and cunning, he wards off every attack, ever watching with an eagle eye for an opening—a chance for a sudden counter-attack. And this is how the well-trained soldier ought to fight: not with blind fury, or sullen obstinacy, but with an intelligent appreciation of the

difficulties and dangers of the situation, and a firm determination to overcome them. The training necessary to this end is discipline, and discipline is not made perfect in ignorance but in knowledge.

With perfect discipline, the emulation given by true *esprit de corps* and the confidence afforded by a sense of being a perfect master of his weapons, the British soldier will fight and conquer as his fathers did in the by-gone years. We may be outnumbered but we shall not be dismayed; we may have few well-wishers and no allies amongst the great powers of Europe and yet we shall cry—

> "Come the three corners of the World in arms
> And we shall shock them. Naught shall make us rue,
> If England to itself do rest but true."

MR. GRIFFITH ON THE TESTING OF SMOKELESS POWDERS.

(Arms and Explosives.)

A HEADING such as the above cannot but arouse the interest of all who are in the slightest way concerned with the manufacture of guns or of small-arms powder. As practically the original chemist and superintendent of the pioneer smokeless powder factory of Great Britain, and we think we might say almost of the world, Mr. Griffith has an experience unequalled in the annals of this industry. In the early days of the Schultze Gunpowder Company, the difficulties which faced them appeared almost insuperable; and at the time when Mr. Griffith was engaged to take charge of the factory where Col. Schultze's products were being exploited a great deal remained to be done before smokeless powders could be considered in any way a reliable substitute for black powder. The chemical properties of smokeless powder necessitated in their manufacture a very much more detailed knowledge of the forces which have to be controlled than in the case of black powder, and the man who would have a smokeless powder in those days had first to invent the machinery and apparatus for obtaining an exact record of its various physical properties.

Mr. Griffith's early days were, therefore, occupied as much, if not more, with problems connected with the measurement of the ballistic effects of his powders as with the questions more intimately connected with the powder itself. He was, however, eminently successful; and, as his inquiries proceeded on the lines dictated by sound scientific knowledge and by a practical mind, he has originated ideas, and formulated these into theories which are now universally accepted as being at the root of the questions with which they deal. For these and other reasons, which do not require further specification, we were led to anticipate that the lecture which Mr. Griffith arranged to deliver on the occasion of the visit of the Gunmakers'

Association to the Schultze Gunpowder Factory would be in its way a record, and we can only say that our anticipations have been justified to their fullest extent.

While this account does not in any way profess to be a verbatim record of what was said, at the same time its substance is given without material deductions. Here and there certain points have been somewhat expanded, as the sense of the lecture in a measure depended upon the apparatus displayed, or on the information which had been obtained prior to the lecture by the visitors in their inspection of the works and laboratories.

The lecturer opened his remarks by referring to the gradual evolution which had brought into existence the present methods of testing the strength of modern small-arm compounds. He explained that before smokeless powders were brought forward, the system adopted was of observing the recoil of the gun and assuming that the penetration would be proportional. When smokeless powders came into general knowledge, however, the extraordinary diminution of the recoil, accompanied as it was by an equally effective flight of the charge of shot, rendered this method of comparison useless, and it became necessary to cast about for some more reliable alternative.

About the year 1870 the great point aimed at was the penetration, and it was this which all the tests of that period attempted to establish. The measurements were taken at a range of forty yards, and it was sought, by working with various forms of targets, to obtain a reliable record of this factor in the travel of the shot. Mr. Griffith explained that he had made exhaustive tests in this direction, and that among the devices employed were the following: Movable targets on wheels, paper pads, tin sheets, wax cakes, water targets, field force gauges, Pettitt's pads, copper sheets, levers and pendulum, straw boards, lead sheets and cardboards. All of these gave some information, but none proved to be reliable in all cases.

Meanwhile Mr. Griffith kept the problem of ascertaining the internal pressure of the gun fully in view, and he sought by various devices to find a practical solution of his desires. His first move in the direction of the measurement of pressure was to obtain from Birmingham a number of cheap gun-barrels. These he tested with successively increasing charges of powder until he arrived at a point where, by careful measurements, it became apparent that the capacity of the gun to resist the internal pressure had been exceeded. Having established this point, it was possible to know whether a certain batch of powder gave results within the limits of the strength of an ordinary gun-barrel. In 1878, however, the first plug gun was made, and it was produced at the lecture. It had an eight-bore barrel, and resembled nothing more closely, owing to the noble dimensions of its form, than a small cannon. The principle, however, was there. Holes were drilled into the bore of the barrel, and these were stopped up with movable plugs, which in their lowest position came flush with the surface of the bore. The pressure of the powder gases inside this gun was resisted by various means, which included such devices as dead weights which operated on the plug through the medium of levers, dead weights directly connected to the plug, and springs acting with a very high tension on the

plug. These devices were far from perfect, but, nevertheless, they gave very favorable data.

This gun was followed in the year 1886 by a lead crusher gun, which was the pioneer of the at present very successful system of plug guns and lead crushers. The plan adopted consisted of placing small cylinders of lead on to the top surface of the plugs, which were at their lower ends exposed to the action of the powder gases. A screw was brought down on to the top of the lead cylinder, and the effect of the explosion was to drive up the plug so as to cause a compression of the lead cylinder against the rigid screw which held it above. These lead crushers gave regular measurements, but the great difficulty was to translate them into pounds per square inch.

Mr. Griffith found it necessary in those days to manufacture his own lead crushers, as he found that nothing he could procure in the market was sufficiently accurate in the leading points on which correct results depended. For instance, lead crushers cannot give reliable results unless their dimensions, their weight, and their hardness are true and uniform. His *modus operandi* in their manufacture was as follows:

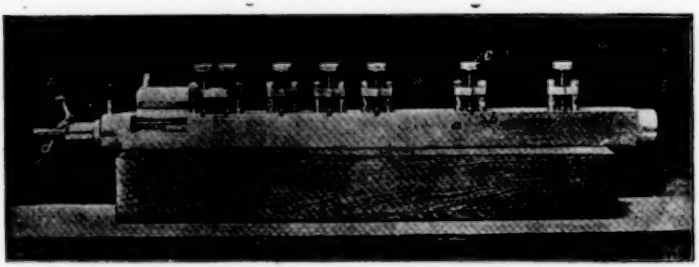


FIG. 1. COGSWELL & HARRISON'S PRESSURE GUN.

Cylinders of lead, as nearly as possible of the correct form, were placed in a press where a uniform blow was struck upon each. The ends were then carefully trued up, and if their weight then proved to be uniform, they were passed as ready for use. Since then, however, Messrs. Eley Brothers, Limited, have undertaken their manufacture, and the results have been of a most satisfactory character. The crushers made by this firm possess all the features of accuracy which the delicate nature of the experiments for which they are to be used require. There is thus no further need to continue the arduous work of manufacturing them on a small scale.

The pressure guns have, since the manufacture of Mr. Griffith's pioneer type, scored an equally satisfactory advance at the hands of Messrs. Cogswell & Harrison, and nothing better could be desired than the various pressure guns put upon the market by them. There are various types of these guns, but the most generally used is that in which there is a single plug at one inch from the breech face. There are others, however, in which a series of plugs are placed all along the barrel, thus enabling the pressur be taken at other distances from the breech face. We illustrate one o

these guns herewith (Fig. 1), and it will be seen to consist of a square block bored internally to the required size of gun. The series of plugs are fixed at the following measurements from the breech face, viz., 1 in., 2 ½ in., 6 in., 9 in., 12 in., 18 in, 24 in. The plug, a, is in communication with the bore of the gun, and the lead crusher, b, is shown with the binding screw, c, holding it in place. The weapon is closed by a suitable form of breech block, and the firing pin, d, is operated by a lanyard. These crushers give remarkably true results, and though there is no way of translating their results into the recognized units of pressure, for comparative purposes, they are extremely valuable. It has been the custom, however, to give equivalents for various crushings in a series of tables in tons per square inch; and although there is no theroretical justification for the actual values assigned, Mr. Griffith expressed the opinion that the table of equivalents, as issued by Messrs. Eley Brothers, went, as far as he could judge from the exhaustive experiments he has made, extremely near to the truth. He used these equivalents in all his experiments, and he was pleased to take the present opportunity of acknowledging his indebtedness to the company for them.

There was one point, however, to which he would like to call attention. It was that the duration of the pressure producing the crushings had a considerable effect on the results, and that unless account was taken of this factor, the readings might appear to be misleading. The following table gives a record of the results obtained from the above gun with various powders, in which will be seen that Schultze powder gives a pressure at one inch of 2.55 tons per square inch, as compared with a condensed powder in a coned case of 2.10 tons, while at 2½ in. Schultze gives 2.62 tons and the condensed powder 2.25 tons,

TABLE OF PRESSURES IN A 12 BORE BARREL, IN TONS PER SQUARE INCH, TAKEN BY LEAD CRUSHERS.

	At from the Breech.						
	1 in.	2½ in.	6 in.	9 in.	12 in.	18 in.	24 in.
Black No. 2	3.16	2.90	1.42	1.28	1.25	1.25	1.15
" No. 4	2.60	2.40	1.45	1.28	1.25	1.25	1.20
" No. 6	2.15	2.04	1.55	1.40	1.28	1.28	1.25
Schultze	2.55	2.62	1.48	1.30	1.25	1.25	1.20
A condensed powder in coned case	2.10	2.25	1.50	1.25	1.20	1.15	1.05
Do. in ordinary case	3.45	2.56	1.50	1.25	1.20	1.15	1.05

On the face of it there appears to be no explanation of this, but the following table, which is a record of the time occupied by the charge of shot in traversing the various sections of the length of the barrel, throws some light on the point. We will explain further on how the measurements are obtained; but for the time being it will be sufficient to indicate that the figures represent the number of ten-thousandths of a second taken up by the charge in travelling, first from the cartridge case to three inches up the bore; second from three inches to six inches and so on.

It will be seen from the second table that while the record of pressure o

TIME TAKEN IN TRAVEL OF SHOT IN A 12 BORE BARREL, TAKEN AT VARIOUS POINTS BY A SMITH CHRONOGRAPH, IN TEN-THOUSANDTHS SECOND.

	Cap to 3 in.	3 in. to 6 in.	6 in. to 12 in.	12 in. to 18 in.	18 in. to 24 in.	24 in. to 30 in.	Total time in barrel in seconds.
Black No. 2.....	72	45	55	45	35	30	0.00282
" No. 4.....	138	52	61	50	40	34	0.00375
" No. 6.....	162	55	65	56	45	37	0.00420
Schultze.....	275	46	57	48	40	34	0.00500
Condensed in coned case....	72	44	57	48	42	37	0.00300
Do. in ordinary case	100	45	58	49	42	36	0.00329

2.55 tons per square inch was obtained with Schultze powder, the pressure producing it was applied during a period of 0.0275 of a second, while with the condensed powder the recorded pressure of 2.10 tons per square inch was obtained with a duration of pressure amounting to only 0.0072 of a second. Of course, it would not be necessary to take these time results in every case, because with the same powder the above general characteristics of time are maintained with a considerable amount of uniformity, and may therefore be remembered accordingly.

While the rough and ready method of testing the violence and penetration of a gun by noting the sensation of recoil felt on the shoulder gave way, on the one hand, to pressure tests along the barrel, it was replaced, on the other, by velocity tests between the muzzle and the target, which are now about to be described. The method adopted consisted in measuring the period occupied by the shot in travelling from the muzzle of the gun to the target at 40 yards, and calculating from this the mean velocity over the distance. For this the Boulengé chronograph was used, and it was sufficiently accurate in itself, though at first there was a difficulty in taking accurate records owing to the "stringing" of the shot. The cause of this difficulty was that a number of pellets reached the target much in advance of the main body of the charge, and severing the electrical connection, gave a wrong idea as to the time of the arrival of the main body of the charge. The problem to which this gave rise was to find a means of eliminating the first arrivals, and this was satisfactorily accomplished in the year 1883 by means of what is known as the sectional target. We may mention, for the information of our readers, that a full description of one of these appeared in our June issue of last year.

The lecturer explained that it would not be necessary for him to give any long description of the method of working the Boulengé chronograph, as it had been out so many years that almost every one was already acquainted with it. The general principle of it, however, is that two weights are suspended from a pair of electromagnets, which, on a severance of electrical current, cease to be magnets and allow the weights to fall. One weight falls when a wire is cut at the muzzle of the gun, and the other falls when the charge reaches the target. When the second weight falls, it operates a knife, which, making a dent on the first falling weight, shows the distance it had travelled before the other began to move, and from this is deduced the time occupied, and thence the mean velocity.

XUM

The disadvantages of this apparatus, however, render it in some ways unfit for the class of work required of it in an explosive factory. In the first place, a reading can only be effected between two points of time. In the second place, the electromagnets are liable to what is known as "residuary magnetism," which is a property they have under certain conditions, to retain enough attractive power, after the circuit has been broken, to delay the fall of the iron weight attached to it. Another disadvantage is that the records of time cannot be taken with the desired amount of fineness. Furthermore, the rate of fall is dependent on the altitude of the particular place where the tests are made; in other words, the gravitational force is not of constant value at all places. Another point is, that the effect of the air resistance cannot be taken into account.

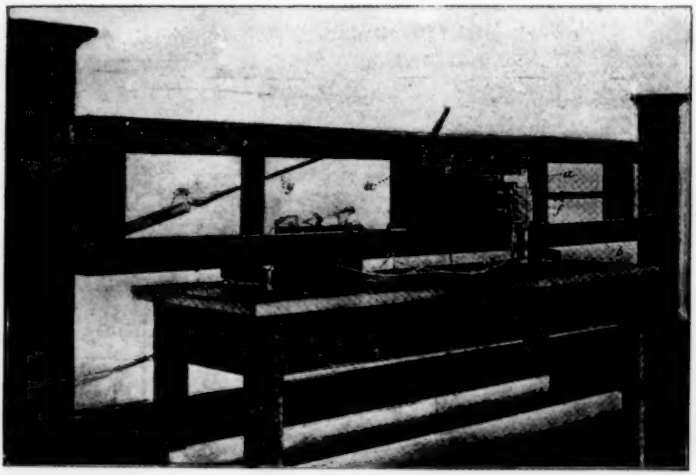


FIG. 2. PROF. SMITH'S CHRONOGRAPH.

The most important of the above objections is, however, that the periods of time are not measured to a sufficiently fine degree; because it soon became apparent, in testing the velocity at 40 yards, that a number of outside factors were introduced which might materially affect the results, but which have no bearing on the efficiency or otherwise of the explosive. Among these may be mentioned the fact that the boring of the gun materially alters the velocity that the charge of shot retains beyond, say, five yards. What was really required was a more delicate chronograph which is sufficiently sensitive to measure the velocity over the first five yards from the muzzle and which could take several records at the same time. One of the effects of measuring the velocity at five yards is that the stringing of the shot has not yet commenced to take place, and consequently any wires that may be severed at that distance are broken practically simultaneously by the whole charge.

The Smith chronograph fulfils these requirements, for it registers readily an interval of 0.0001 of a second, and may be used to take simultaneous records. An illustration of this chronograph is given herewith (Fig. 2) and it will be seen to consist of the carriage, a, which travels in guides from one end to the other of the frame, b. The carriage is forced up to the right hand end against the pressure of a spring, and when it has reached its ultimate position it is automatically locked by means of the catch, c. The handle, d, is connected with the catch holding the carriage in check. This gun is fixed, as shown in our illustration of the trial gallery (Fig. 3) and wires communicate between it and the chronograph. The muzzle of the gun is pointed to the cast iron block, z, which is suspended in the air, and which has wires fixed across the hole in the centre, which are broken by

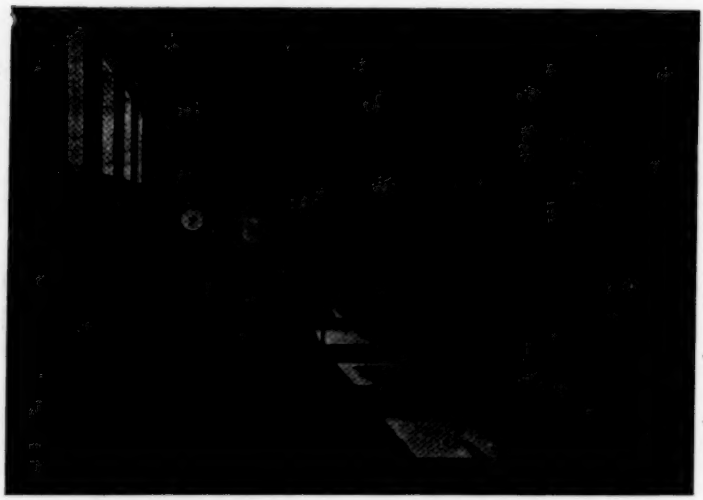


FIG. 3. TRIAL GALLERY.

the shot pellets. Returning to the chronograph, attention should next be called to the glass plate, e, which is fixed on the carriage. This glass plate is evenly smoked over the surface by means of a benzine lamp, and it is by the markings on this plate that the records are obtained.

The medium for producing the marks is the electrical marker, f, which is shown separately in Fig. 4. It consists of a tuning fork, g, which is adjusted so as to give the musical note which corresponds to 10,000 beats in a second, or any other that may be decided upon. The tuning-fork is provided with a scratching point, h, which comes into contact with the surface of the smoked plate of glass. Three other indicators, i i i, are arranged beneath this, and they will be seen to consist of scratching points, j, which are actuated by electromagnets, k. In order to fire the gun and obtain these records of time, the tuning-fork is given a slight tap, and immediately after-

ward the handle, d, is pulled. The pulling of this handle serves to release the sliding carriage, a, of the chronograph, which in its turn discharges the gun at the proper point in its course. As the sliding carriage slides along the frame, the point. h, of the vibrating tuning-fork scratches a wavy line on the smoked surface of the glass plate. The recording magnates, k. are actuated when the charge leaves the muzzle, and when the shot has travelled five yards

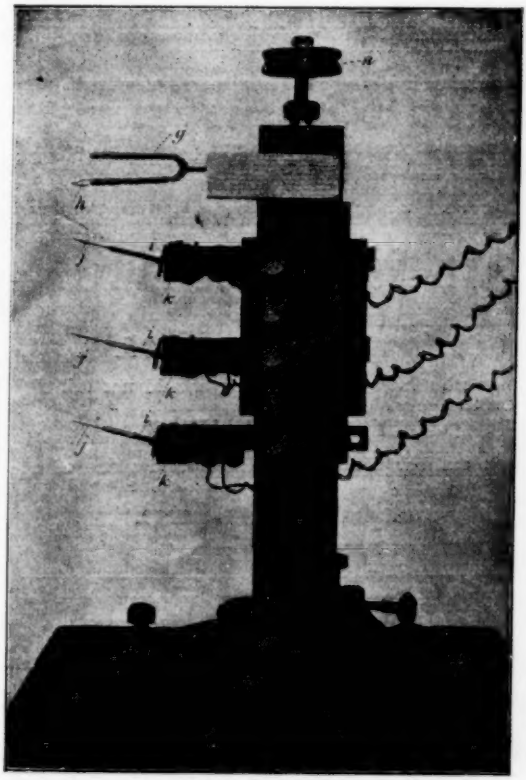


FIG. 4 MARKER FOR SMITH'S CHRONOGRAPH.

or otherwise, according to the arrangement of the connections for the particular test in progress, in the following manner: These points are mounted so that a spring is always tending to pull them upward. Some very small magnets, so small in fact as to diminish within reasonable proportions the tendency to residual magnetism, are arranged to hold the pointers in a downward position. When the electrical circuit is broken, the magnets, losing their power, allow the spring to pull the pointer upward, and the

line, which the pointer was previously scratching on the smoked surface of the glass plate, takes a sudden turn upward and then continues to describe the line in its new position. The carriage, having passed beyond the electrical marker, is brought up by coming into contact with the piece of leather, l, which is kept taut by the spiral spring, m. When a record has been obtained on the above principle, the screw, n, which is shown on the electrical marker, is given one turn, and this has the effect of bringing each of the scratching points a little lower down and so opposite to an unscratched portion of the smoked glass plate, and after reloading the gun, a fresh series of measurements may be made.

In order to make it clearer as to how these records are obtained, we reproduce in Fig. 5 a series of actual readings which were obtained on this

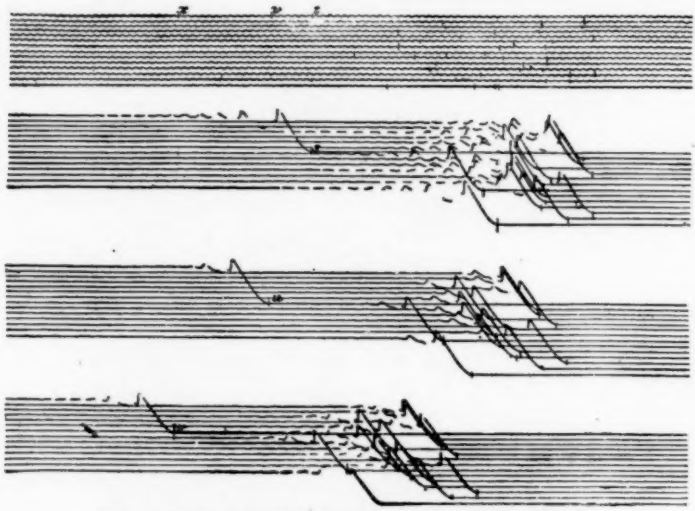


FIG. 5. ACTUAL RECORDS WITH A SMITH'S CHRONOGRAPH.

principle. It may be explained that when it is required to keep a permanent record of one of these plates, all that is necessary is to treat the smoked plate with the scratches on it as a photographic negative, and print off from it as many copies as may be required. Our illustration represents a print obtained by this means. It will be seen that the plate contains a record of no less than fourteen sets of measurements. The wavy lines of the top band of scratchings are those made by the tuning-fork, while the remaining three bands are those produced by the electrical markers. The top wavy line corresponds with the topmost scratching of each of the three bands beneath. The second wavy line corresponds to the second scratching of each of the series of lines beneath, and so forth. The top series of lines may, for the sake of an example, be taken to represent the

nt at which the first wire was broken by the fall of the hammer; the

next series of lines may be taken to represent the time at which the charge arrived at the muzzle; and the third series of lines may be taken to represent the arrival of the shot at five yards from the muzzle. The edges of the glass are made strictly square, and all that is necessary is to mark off on the corresponding position on the line of waves a line opposite to where the electrical indicator commences to give the line an upward turn. Dealing only with the first reading, it will be seen that the mark, s, has been projected into its corresponding position, t, on the wavy line. Further, the mark, u, has been projected to the position, v, and the mark, w to x. It will be seen, that there are thirteen distinct waves between t and v, and six waves between v and x, which establishes that 0.0013 of a second were occupied by the period from the fall of the hammer to the arrival of the charge at the muzzle, and 0.0007 of a second for the charge to travel from the muzzle to the 5 yards target. Of course it will be understood that these explanations of the table are purely fanciful, as we have no record before us as to what the actual results are which were being taken on the plate before us. The above supposed measurements on our part would give a velocity of 21,000 odd feet per second, which is of course ridiculous.

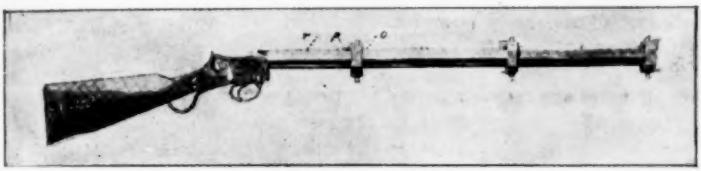


FIG. 6. PLUG GUN.

We do not even know which tuning-fork produced it, for, as a matter of fact, there are several sizes which give widely different number of beats per second according to the nature of the work in hand.

It should always be remembered that any number of marking points may be used together, all that is necessary being to increase the glass plate to a size sufficient to receive all their impressions.

An important use to which this chronograph has been put is the previously noticed measurements of the time occupied by the charge of shot in traversing the successive sections of the barrel's length, and this is done in a fairly simple manner. Instead of connecting the wires from the electrical indicators of the chronograph to the muzzle of the gun, etc., they are carried to the special gun, which we illustrate herewith (Fig. 6). It is known as the plug gun, and it will be seen to consist of a shot-gun with a Martini action. The barrel of the gun is perforated at intervals in its length at the distances indicated in the second of the tables quoted at the commencement of this article. While these holes are so small that the escape of gas through them, if left open, would not amount to a loss resulting in more than one foot per second in the muzzle velocity of the gun, they are at the same time sufficient to enable the operator to introduce into it an electrical conductor, which is broken by the charge as it passes that particular point

along the barrel. The term electrical conductor is used advisedly, because an electrical wire would not give results of sufficient accuracy; for the passage of the charge would not cause the instantaneous fracture required. The wire would be drawn out for some distance beyond the point where nominally it would be supposed to have broken. Furthermore, the drawn out ends of the wire might prevent the complete breakage of the electrical circuit, as they would be quite likely to be carried beyond the insulating plugs, in which they would have to be embedded, and thus they would maintain the continuity of the circuit by pressing against the sides of the barrel or against the charge of shot.

The way in which this difficulty has been overcome is most ingenious. As is known to most of us who have done any glass blowing, a piece of glass tube, if warmed in the centre and pulled out, may be drawn to a thread as fine as a hair, and yet with all this the minute hair still remains as perfect a tube as the original one from which it was drawn. Mercury is filled into a short length of a suitably fine tube obtained by this means, and the ends of this capillary tube (as it is known to scientists) are connected to short wires, which in turn are connected with the electrical markers on the chronograph. The required number of these glass tubes is put into the gun, and the charge may always be relied upon to produce an instant interruption of the electrical circuit established through them.

This is the way our second table was arrived at, and it is unnecessary to point out that the results are obtained from the mean of a number of shots fired presumably in two series, as the particular chronograph here illustrated is only provided with three electrical markers. The most interesting feature of the plug gun, which gives us measurements of the periods of time occupied by the shot along the barrel, is the fact that it enables us to establish a certain practical relationship between the records with lead-crushers and their so-called equivalents in tons per square inch. It is known to all, that the gravitational attraction of the earth produces a definite ratio of increase of velocity in bodies allowed to fall freely under its influence. In exactly the same way it is a simple problem in applied mechanics to produce from the velocity acquired by a charge of shot of a known weight, over a known distance, the effective mean pressure which brought this about. Thus, turning to Table I. with Schultze powder, we know that, from a state of rest, the shot reached three inches during a period of 0.0275 of a second, and from three inches to six inches there was such an increase of velocity that this distance was traversed at 0.0046 of a second. From these figures the effective pressure which produces these results can be deduced, and the pressure so calculated can be compared with the amount of crushing which the leads receive. Though such calculations can take no account of the pressure in the gun, which was neutralized by the friction of the charge of the barrel, they give extremely valuable results for comparative purposes.

In our illustration of this gun, p shows the places where holes have been made in the barrel for the reception of the capillary tubes, and o is a sleeve fixed on the holes where tests are being made, and it is used for holding the insulated terminals for the electric circuit.

In connection with the general question of measuring the velocity of shot-guns, it may be interesting to point out that the records show a gradual improvement during the past twenty years. In 1878 the acknowledged standard velocity was 845 foot seconds. In 1886 it had risen to 855 foot seconds, and now an average of 870 to 880 foot seconds can be relied upon at 40 yards with No. 6 shot. From this there appears to be every prospect of reaching a muzzle velocity of 900 foot seconds without disturbing the excellent patterns given with the lower values at present in use.

Mr. Griffith, in continuing his lecture, explained that the method in use at the Schultze factory is to test chemically for purity daily, and with the above apparatus for the internal pressure and velocity. The powder is then stored away for three months, when the tests are repeated, and the results are also taken at 40 yards simultaneously with an observation of the patterns produced. In reference to patterns, however, Mr. Griffith explained that that was a question which concerned more closely the ammunition manufacturer and the gunmaker. The powder imparts a given velocity to the shot at the muzzle and it remains with the ammunition and the gun to insure that that velocity was suitably utilized, and that the resulting patterns should be in accordance with the requirements of the sportsman.

In conclusion, the lecturer explained that though some portions of the work of a gunpowder manufacturer and tester had not yet become an exact science, at the same time when one considers the many side issues which, though not capable of independent estimation, may materially affect the results, the progress so far obtained appears extremely satisfactory from the practical point of view.

Among the different points influencing the science of ballistics may be mentioned the following: Charge of powder, charge of shot, composition and quantity of primer, flash hole, wadding, stiffness of paper tube, turnover, boring of gun, shape of cone, choking. When all of the above are considered, it seemed to the lecturer that the powder manufacturer and the gunmaker may be congratulated on the excellence and regularity to which their various manufactures have attained.

Military Notes.

THE FIRST LINE.

THE handling of the first, or containing, line presents so many difficulties and requires so much study that a discussion on the subject must always prove interesting to officers who have got beyond thinking of the attack merely as a parade movement and who are aware that exact lines, carefully measured advances, and chess-board reinforcements are not the only requisites to fit a battalion to take its place in the first line on the field of battle. It is of little consequence whether it is called the "first line" or the "containing line," although perhaps the latter is preferable if there is any advantage in a name which denotes its duties, for a containing line it certainly is. Its duty is to creep up towards the enemy's position, suffering as little as possible in doing so, and, having arrived at a position suited for its purpose, to occupy the attention of the enemy along the whole front and, without allowing itself to become involved in any effort to assault which may result in its being driven from the ground it has won, to smother the enemy's fire and thus to conceal the advance of and prepare the way for the assaulting columns. It is impossible to lay down any hard-and-fast rule as to the best position for this line to establish itself; as it depends, first, on the nature of the ground; secondly, on the amount of resistance it meets; and, thirdly, on the support it can expect. The great advantage in this line establishing itself as near to the enemy's position as possible, if it can do so without too much sacrifice, is, as the assaulting column must sustain the heaviest losses during the time it is advancing over the ground between its own containing line and the enemy's position, the shorter that distance is made the better for the assaulting column. Too great stress cannot be laid on that "if," as the fact must not be lost sight of that the expenditure of life necessary to get the first line so near the enemy's position would, in many instances, be more economically spent on the assault. The first line, unless it is aided by a ridge of hills or other cover at a convenient distance from the enemy's position, behind which it can creep up unmolested, will be compelled by nature to lie down and cover itself with fire, and it will take just the same new vigor imparted to it to carry it on a few yards as the front lines of the assaulting column will require, with this difference: the assaulting column will only be on a breadth of, say, 120 or 150 yards, while the first line will be on a breadth corresponding to the breadth of the enemy's position; therefore the expenditure required to push the containing line on thirty yards would, in all probability, be as much as that required to push the front lines of the assaulting column on several hundred yards. Also it must

be remembered that the closer the containing line to the enemy's position the less chance it will have of repelling a counter attack. The most suitable position for the first line to hold must therefore remain a question which the nature of the ground and the bullets of the enemy can alone decide, but the argument for or against a near approach should always be kept in view and carefully considered.

The next point to consider is what its duty is when it arrives at this position. The "Infantry Drill" is very clear on this point. It says the first line should "keep up the most effective fire possible" and "establish itself in a good defensive position whence both false and real attacks can be made on the position in front." It is a pity it did not add, "by the second line." Too great care cannot be taken to insure that this first line has sufficient strength, first to enable it by itself, without the help of the assaulting columns, to reach the most favorable position for it to establish itself; second, to enable it to pour an effective and well-sustained fire into the enemy's position when it gets there; and third, to enable it to arrive there with such confidence in its own strength and with sufficient support close at hand that it will stand its ground steadily against any counter attack that may be launched against it. It should be borne in mind that once the first line has established its firing line in the selected position constant reinforcements will have to be at hand, and that they are sufficient to insure the maximum number of rifles being in the firing line which can be employed. Now the first line should be taught to depend on itself to accomplish these ends. It has nowhere to look for help, the assaulting columns and the third line have their own duties to perform, and so whatever is to come to the first line must be supplied by that line itself. The amount of resistance that will probably be met must be carefully considered by the commander in order that he may place sufficient troops in his first line to insure that the duties entrusted to it are carried out, the most successful and economical commander being he who throws his last reserve into the firing line just as the enemy, his position assaulted at one or perhaps more points, begins to retire along the whole line. This can only be arrived at by economical reinforcements at the early stages of the advance.

One of the most discouraging features in all the attacks during the recent manœuvres was the way the commanding officers, in spite of the instructions they have received on that very point, recklessly used up their resources in the early stages of the attack. Whether it was from the habits of the barrack square, or whether it was they did not look far enough ahead, the fact still remained that, as a rule, after the first line had advanced a short distance, and often before it had been seriously engaged, supports and reserves had been hurried into the firing line, and no reinforcement was left to push the line on when it was most in want of a fresh impetus.

Now as to the formation in which to bring up the first line to the desired position. It must have struck any onlooker during the recent manœuvres that commanding officers did not grasp the difference between advancing under cover and advancing under fire, and the ordinary formation

that was adopted was an extended line, followed some 200 or 150 yards behind by a support in single rank, followed a similar distance behind again by a reserve generally in line. If the advance was being made under a galling fire, and when crossing a plain within range of the enemy's bullets, little fault could be found with such a formation, but seldom during the manœuvres was an attack made over a plain of any extent, but the extended lines were there all the same. On the last day of the Aldershot manœuvres during the conference the Quartermaster-General said: "The advance of this division on the line of intrenchments was in a faulty formation * * * cover could have been found on the lower spurs of Chobham ridges and the men kept in company columns." The Commander-in-chief said: "Emphasis should be put on the remarks of the Quartermaster-General as to the proper formation for advancing over the country that presented itself, and the regular lines should have been broken up into company columns." These remarks cannot be too well understood or too carefully acted on. Now, taking for granted that the aim and object of the first line is to get to the position selected for it with as little loss as possible, and without shattering the men's nerves by useless exposure, it would appear that any formation should be adopted which would allow of an advance under cover. But another object must not be lost sight of, namely, the necessity of at any moment having to deploy into rank entire should a bullet-swept zone have to be crossed. At first it seems difficult to reconcile these two objects, and if rigid notions of drill and parade ground are to be entertained it is impossible; but with a carefully-trained set of company and section leaders these difficulties at once disappear. An extended line is a formation difficult to handle, but if there is no necessity for the extension, viz., when out of range or when under cover, the advance should be made in, say, columns of companies, half companies, or sections, as if moving to a flank covered by a few scouts. If these little columns move at double deploying interval, at any moment the columns may be extended and a line in rank entire exposed to the enemy's view, which, if cover is again obtained, can easily be drawn together and again moved in little columns. The same applies to supports and reserves, which should in the same circumstances advance in company, or half-company columns, as if moving to a flank. The necessity for good leading now makes itself felt. Frequently the formation of the ground or the necessity of clearing the front of guns in action would force these little columns either to expose themselves or to go out of their way and close in on the sections to the right or left. This can only be done by the leader of the little column himself, who should know his general line of advance, should know the directing unit, and should be fully aware of the necessity of keeping his station, to borrow a naval expression, but who at the same time should be on the alert to take every advantage of ground offered. Not the least difficult duty is that of the leader of the unit of direction, as he must not only guide his own unit, but must keep his eyes open to see what the units on his right and left are doing, so regulating the pace as to insure no unit being left behind or being unduly hustled. If leaders of these units, whatever they be—companies, half companies, or sections—were trained to carefully study ground,

and were made to understand that their duty is to pilot their command with as little loss as possible, and without losing station to such a degree as would create confusion, to its allotted position, easy will be the task of the commander, whose one object should be to get the first line to the best position at which it can fulfil its proper task, viz., prepare the way for the assaulting column. Commanding officers often exercise their battalions in the attack, but it is feared that more attention is paid to the smartness of drill than to the much more important business of training unit leaders. The commanding officer who realizes the importance of unit leading, and spares no time in instructing those leaders, will be amply repaid for his trouble if his battalion is ever called upon in war to form one of the battalions in the first line.—*The Army and Navy Gazette.*

THE FOOD VALUE OF CHOCOLATE.

Some years ago a distinguished member of the French Institute, Jean Baptiste Joseph Dieudonné Boussingault, who in his youth served on Bolivar's Staff in South America, printed in the *Annales de Physique et du Chimie* an interesting paper on the food value of chocolate, from which we take the following extracts:

"Chocolate contains a very large proportion of nutritive matter in a small volume. In an expedition to a great distance, where it is imperatively necessary to reduce the weight of the rations, chocolate offers undeniable advantages, as I have had frequent occasions to notice. Humboldt recalls what has been said with reason, that in Africa, rice, gum and butter enable men to cross the desert; and he adds that, in the New World chocolate and corn-meal render the plateaus of the Andes, and the vast, uninhabited forests, accessible to man.

"In Central America, when they organize a river expedition, or traverse the forests, they prepare chocolate for provisions with eighty parts of cocoa to twenty of coarse sugar, the composition being as follows:

Sugar	200
Butter	410
Albumen	100
Phosphates and salts	30
Other matter.	260
	1000

"Each man receives 60 grammes (about 2 ounces) of this chocolate per day, in which there are 12 grammes of sugar, 26 of butter, and 6 of albumen. It is a useful addition to the ration formed of beef slightly salted and dried in the air, of rice, of corn biscuit, or of cassava muffins.

"The infusion of tea, maté (Paraguay tea), and coffee are not, of course, to be considered as food. The amount of solid matter in them is very slight, and their effects are due only to their alkaloids.

"This is not true of chocolate, which is at the same time complete food and an active excitant, since it approaches in composition that model food, milk. In fact we have seen that in cocoa there is legumine and albumen, associated with fat, sugar to sustain respiratory combustion,

phosphates, which are the basis of the bones, and—what milk does not have —theobromine and a delicate aroma. Roasted, ground and mixed with sugar, cocoa becomes chocolate, the nutritive properties of which astonished the Spanish soldiers that invaded Mexico."

THE VICTORY OF SHOT OVER ARMOR.

The penetration of 10 inches of nickel steel, face hardened, reforged plate by a 6-inch shot on September 5 was in itself a phenomenal performance, and places the gun once more far in the lead. But when our readers learn that, after penetrating the plate, the shot passed through 12 inches of oak and three plates $\frac{7}{16}$ inch thick, and was finally found 8 feet back in the sand and practically uninjured, they will understand how complete is the superiority of the best type of shot over the best type of armor to-day.

It is a matter of history that, just at the time when armor-plate makers were discouraged by the ease with which the gunmakers were able to penetrate the toughest nickel steel, Mr. Harvey produced his brilliant invention for giving an intensely hard face to the plate, and succeeded in smashing up the projectiles at the moment of impact. Shots which theoretically should have passed clear through a Harveyized plate failed to do so, because their points could not hold together long enough to break in through the highly tempered face, which was made so hard that it could cut glass like a diamond point.

Subsequent to the appearance of Harveyized armor the makers of projectiles have been trying to produce a shot which should combine the necessary hardness and toughness to enable it to split open the hardened face and hold together until it had wedged its way through the body of the plate itself. A few of the best makers have met with partial success. The Holtzer in Europe and the Sterling-Wheeler in this country have succeeded in breaking up the face; but the effort has proved too much for the shell, which has usually collapsed before it could get entirely through the plate. This has been the case almost invariably when the improved reforged Harvey plate has been attacked. The result is shown very clearly in the case of shot No. 1 in the recent trials, when an 8-inch Holtzer shot, weighing 250 pounds, and fired with a velocity of 1800 feet a second, entered the plate and broke up, leaving the point embedded.

For many months the reforged Harveyized plate held its superiority, and it looked as though the final victory in the long contest between shot and armor was to rest with the armor. The next move on the part of the artillerist was of a very extraordinary, but very successful kind. He placed a cap of soft steel over the point of the shot to protect it, and, paradoxical as it may appear, the soft cap enabled the shot to get through.

The part played by the cap may best be explained by a simple experiment which can easily be tried by any of our readers. An ordinary sewing needle may be driven through a copper cent piece by thrusting it through a cork until the point is flush with the bottom of the cork, placing it upon the copper cent, preferably over an anvil, and giving the head of the needle a sharp tap with a light hammer. The copper will be cleanly perforated. The surrounding cork holds the body of the needle in the line of the blow,

so that its whole force is concentrated at the point. The action of the cap is somewhat analogous. It preserves the integrity of the point of the shot at the moment of impact, holding the material together until penetration through the hard face is effected. Moreover, the cap becomes fused by the heat of concussion and lubricates the point as it enters. After the face is broken through, the Johnson shot holds together by virtue of its peculiarly hard and tough composition, which is obtained by a secret process of manufacture.

Shot No. 2 represented a 6-inch 100 pound Johnson shot which was fired with brown powder at a velocity of 2100 feet per second. It penetrated to a depth of 8 inches and communicated all of its theoretical capacity at that velocity, the rear portion of the shot breaking off and rebounding from the target. Mr. Johnson was confident that if the shot were given greater velocity, it would make a clean penetration, and accordingly a charge of 28 pounds of torpedo station smokeless powder was inserted for the next round. The shot, weighing 105.25 pounds, struck the target with a velocity of 2505 foot seconds and an energy of 4594.8 foot tons at a point 21.5 inches normally from the bottom, and 32 inches from the left edge of the plate. The work of the shot, which passed through the plate practically uninjured, can best be given in the words of the official report:

Action of projectile.—Projectile penetrated plate, backing, boiler plates, and was recovered 8 feet back in the sand, entire, with the exception of one-half of base broken off diagonally to the bandscore. The remaining portion of the shell was in excellent condition, with the point whole, the head slightly scored, increased in diameter at the bourrelet 0.15 inch and in body 0.06 inch; length decreased 0.49 inch. Two small surface longitudinal cracks in the body 5.5 inches and 2 inches long, also two in the head 1.5 inch and 2.5 inches long respectively. Four fragments recovered; total weight, 95 pounds; weight of the shell proper, 85 pounds.

Effect on Plate.—Penetration complete; diameter of shot hole, 6⅛ inches; interior for about 3.5 inches in rough, with fused metal, rest of hole smooth, all the interior being coated with copper, probably from the rifling band. Diameter of splash and flaking, 13 inches, ⅝ inch deep. The boiler plate backing was star opened to a diameter of 16 inches.

A comparison of the two cuts showing the projectile before and after firing will show the wonderful endurance of the shot. The deep scorings on the conical head were produced by the jagged edges of the hardened armor face, and the twist imparted by the rifling is plainly discernible. The corrugated recess at the base is the seating for the copper rifling band, which, as the report states, was sheared off in the shot hole, together with diagonal fragments of the base. Altogether this is by far the most brilliant performance of any shot in any country, and the two photographs which are now presented to the public for the first time are well calculated to carry dismay into the camp of the armor plate makers. Messrs. Johnson & Company, of Spuyten Duyvil, New York, are to be congratulated on a success which has come as the result of many years of costly experiment; and the country at large will be pleased to think that, if Harvey's plates have been signally beaten, it is an American projectile that has done it.

Incidentally it should be noted that the success of the second Johnson shot was only achieved by using a high velocity, considerably higher than the 2000 feet per second which is obtained with the standard brown powder used for United States ordnance. Mr. Johnson is asking for 3000 feet per second in order to develop the full potentiality of this solid shot : and it must certainly be admitted that the introduction of smokeless powder, with its higher velocities, would be an advance along the lines which are being universally followed by the gunmakers of England and the Continent. The 10-inch Brown segmental wire gun now in course of construction by the Government will have a maximum velocity with smokeless powder of 3000 feet per second, and would seem to be the natural counterpart of the Johnson shot. The *St. Louis* and the *St. Paul* are designed to carry a battery of 6-inch guns, and if these guns were to be of the wire wound pattern, and the ammunition included smokeless powder and a certain number of rounds of Johnson shot, these cruisers would have three-fourths of the armor plate now afloat at their mercy.—*Scientific American, December* 5.

FRENCH QUICK-FIRING FIELD-GUNS.

One of the points which occupied the attention of Li Hung Chang, during his recent tour through Europe, was the progress made by different nations in the development of quick-firing field-guns. It is said that he was, at St. Chamond, in France, initiated into the mysteries of the new French field artillery of this character, which is interesting scientific gunners so much at present. The application of the quick-firing principle to field-guns of ordinary calibre, although an idea of somewhat recent growth, has been the dream of enthusiastic artillery officers, and of the large war material producing firms, ever since its success was so entirely assured in regard to naval guns. But the difficulties appeared to be insurmountable. The jump and recoil of a field-gun seemed to be inseparable features attaching to its employment. Then there was the prejudice against carrying ammunition fitted with primers in limber boxes; and however one might reconcile one's self to the dangerous character of this last condition, the fact that a very slight movement of the gun in recoil destroyed the elevation and training was fatal to the application of the principle, unless the movement could be absorbed. Messrs. Gruson, of Magdeburg, experimented for years with quick firers of various types, having calibres up to 8 centimetres, and an elaborate system for correcting the deviation in direction caused by recoil, the weight of the carriage being greatly increased by that of the mechanism required; but it was found that the carriage, even when perfectly skidded, ran back nearly a metre, and that it was only with much smaller calibres that the recoil could be absorbed within manageable limits.

In our own country we do not think that the system has hitherto had a fair trial. So great is the feeling of field- and horse-artillery gunners against any innovation from perfect simplicity in the form and design of guns and carriages for their arm of the service, that the very fact of a gun being slung in a cradle, and without trunnions, and of its carriage being provided with recoil cylinders and running out springs or training segments, would be sufficient to condemn it in the opinion of many commanding officers of

field or horse batteries. Nevertheless, it goes without saying that the army of the future which is provided with an artillery armament of satisfactory quick-firing field-guns, and an ample supply of ammunition, will possess an element of dire and terrible potency, against which ordinary field-guns, firing their conventional one or one and a half rounds per minute, would be absolutely nowhere.

Under these circumstances it is satisfactory to learn that efforts are being made by private manufacturers in this country to supply the much needed quick firing field-gun. We have, by the courtesy of the Maxim-Nordenfelt Company, been enabled to produce in our columns this week engravings of their quick-firing field-gun of 7.5 centimetres, which was fired, with remarkable success, upon the company's shooting ranges at Erith, in the presence of Li Hung Chang. We have also been furnished with the following particulars in regard to the gun.

The principal data which have served as a basis in the design of this novel weapon are briefly:

The employment of fixed ammunition with primed metallic cylinders. Closing of the breech with an interrupted screw, of great simplicity, of rapid and easy manipulation, composed of massive parts, and absolutely assuring extraction of the empty cartridge cylinders. Facilities for dismounting, without any tool, of the firing and breech closing mechanism admitting of the immediate change of a "striker," or of its spring. Recocking the gun without opening the breech. The employment of hydraulic brakes, absorbing part of the recoil, and reduction of the "jump" of the carriage. Separate gear for training and elevation to be worked by the "laying number" who sits at the side of the trail; he also to fire the gun. Automatic brakes of great simplicity on the wheels. A light steel shield to protect the "laying number" against rifle bullets or shrapnel. Total weight of "heavy equipment" drawn not to exceed 3968 lbs. Total weight of "light equipment" drawn—for horse artillery—not to exceed 3307 lbs. Employment of a single projectile, with a few rounds of case-shot.

The gun is of the ordinary tempered steel type. Being intended to slide in a cradle, which forms part of the carriage, it does not carry trunnions. The two projections receive the piston-rods of the hydraulic brakes, while upon the right side of the breech are found the lugs of the hinge for the breech-closing gear, and the lugs forming the supports of the extractor. The grooves of the rifling are thirty in number, uniform, and their angle of inclination is 6 degrees. Their width of 5.8 mm. at the commencement diminishes gradually to 4.9 mm. at the muzzle, causing a continual compression of the driving ring during the passage of the projectile through the bore of the gun, which diminishes the chance of gas escape and consequently of erosion. The depth of the grooves is 0.58 mm.

The breech-closing gear is somewhat different to any hitherto employed. The breech-screw is actually conical, but the largest diameter is at its interior extremity. Nevertheless, it hinges out upon the carrier without any longitudinal movement being required, the seating being sloped away to a certain extent to admit of this. This arrangement is said to obviate all possibility of the breech-gear being forced out by excessive pressures. The

extremity of the manipulating lever has a segmental pinion engaging with a cogged segment in the breech-block. The first portion of the movement then makes the block revolve and unscrew 90 degrees, the cogs of the pinion being placed eccentrically to its axis, so that they recede as the block goes out and preserve their engagement. A claw on the pinion now sets against the breech-block and brings it out, instead of making it revolve further. The 90 degree revolution brings the threaded portions of the screw against the smooth portions of the seating. The striker is actuated by a spring pressing between the sleeve and its solid point. Turning the breech-block presses the two helicoidal surfaces upon projections behind the striker, and cocks the gun, the striker itself being prevented from rotating by the directing arm, which can only work longitudinally. This directing arm is prolonged beyond the carrier and ends in a hook, by which the gun can be recocked in case of a misfire without opening the breech. The extractor oscillates around an axis fixed in the two lugs; it has two extracting claws. By the movement of the curved heel the process of extraction, slow at first, finally ejects the empty cartridge cylinder with a jerk. The ordinary trigger mechanism is seen and the firing lever. A safety trigger, composed of a heel at the end of the prolongation, slides in the groove, and prevents the act of firing until the moment when the breech is closed. The breech-block is prevented from oscillating unduly around its axis by a spring button. A bent lever, actuated by a spring, something like the brake on a bicycle handle, secures the working lever of the gun in its position against the breech when closed. The breech-closing gear is provided, when required, with an arrangement for preventing the opening of the breech in the event of a hang-fire having taken place. It is only released by the shock of discharge.

The carriage has a jacket or cradle of cast-steel, in which the gun slides, fitted with hydraulic brake cylinders, favorably situated with regard to the axis of the gun and the line of recoil. The recoil in the cylinders is 12 in. The gun-jacket and hydraulic brake are upon a semicircular platform, being secured by the clamps. The pivot is the centre of movement of the whole system for a training of 9 degrees. The lower part of the pivot and the cushion work by a screw upon the fixed cylindrical axis, secured to both brackets of the carriage. It will be seen, by a reference to the drawing, that the axis of the gun is low down, and very near the centre of the axletree, and consequently that the angle of the trail is a very acute one, if the wheels are of the ordinary height. This is a great advantage, as it prevents jump. A cogged segment, engaging with the endless screw, manipulated by the training wheel, gives training through an arc of 9 degrees without altering the position of the trail. The elevating screw and wheel can be seen. They admit of 15 degrees of elevation and 5 degrees of depression. The sights are fixed upon the side of the jacket, and consequently do not recoil with the gun. This is a manifest advantage. The training and elevating wheels are so placed that the "layer," seated upon the seat, can without any inconvenience, elevate, having the right hand upon the wheel, while with the left he works the training wheel. The elevation once obtained, his right hand is free to pull the trigger and fire the

gun. The extremity of the trail is provided with a short spade for the purpose of further checking the recoil, fixed beneath a plate sufficiently large to prevent the burying of the trail in the ground. The axletree carries at each side, near the wheels, a ring, the position of which is slightly eccentric in regard to its axis, each ring receiving the end of a drag iron, intended to skid the wheels during firing. These drags are in all respects automatic, for the more the wheels have a tendency to turn during recoil, the more firmly are they skidded. On the march the drags are hung at either side of the trail. A trail box for tools, sights, spare parts, etc., is provided. The carriage is provided with a steel shield, 6 mm. thick, of special quality, resisting rifle bullets at a distance of 20 metres.

The following are the principal dimensions and particulars which should be noticed:

	Heavy gun.	Light gun.
Calibre of gun—7.5 centimetres.....	2.95 in.	2.95 in.
Length of gun.....	30 calibres	24½ calibres
Weight of gun and breech gear.....	734 lb.	624 lb.
Height of axis of gun above ground.	36.34 in.	33.25 in.
Weight of the carriage with wheels..	1,828 lb.	1,431 lb.
Angle of recoil upon the ground....	30 degrees	30 degrees
Weight of loaded projectile shrapnel.	13 lb.	11¾ lb.
Weight of round complete of fixed ammunition.....	16 lb.	14 lb.

The fixed ammunition is loaded horizontally in limber boxes, thirty-six rounds being carried with the heavy gun equipment and forty-eight rounds with the horse artillery equipment, upon the gun limber. The initial velocity with the heavy gun is about 500 metre seconds.

The above is a very much curtailed description of this new quick-firing field-gun, which appears to answer the majority of the requirements demanded by modern horse and field artillery. It is wonderfully light, well placed on its carriage as to recoil, and the entire weight behind the team considerably less than that carried by our horse and field batteries. One of the principal questions which occurs to us is the supply of ammunition to the quick-firing field-gun of the future, as the limber boxes are exhausted. With rapid work the gun limbers and ammunition wagons would be emptied in a very short time, and the arm would be helpless if there were no reserves handy. This point has, however, nothing to do with the efficiency or non-efficiency of the gun we have been describing. It worked with the utmost smoothness at Erith, in the presence of Li Hung Chang, and the difficulty of recoil appears to have been grappled with in the most masterly manner, without unduly increasing the weight of the carriage. Of course, the spade would not strike into the ground if there happened to be solid rock beneath the trail, but this would probably be an unusual circumstance. —*The London Engineer.*

QUICK-FIRERS FOR FIELD ARTILLERY.

The real strength of the case for the adoption of quick-firers for field artillery hardly seems to us to have secured the consideration it deserves either in our own or in any other country. It is an open secret that France, Germany, and Russia all possess sealed patterns of quick-firing field-guns

which are capable of indefinite multiplication once the funds are forthcoming, but, as in our own country, there is not that weight of expert opinion behind the movement to overcome the inertia of their respective treasuries. The reasons for this want of professional support are well worthy of attention, for though we hold them to be for the most part groundless, they indicate, on the one hand a sound, practical grip of the conditions of modern warfare—a grip that experience has shown to be sadly wanting in the partisans of infantry rearmament, and, on the other, a species of conservative reaction against mechanical processes and improvement which reveals not only unfamiliarity with mechanical development but also a want of grasp of the true tactical principles which are involved in the question. To take the latter first. No quick-firing field-gun, speaking generally, has attained the same ratio of efficiency on the practice ground to weight of load behind the horses, round per round, of the ordinary service weapons. It has either been found necessary to reduce the weight of the shell whilst retaining the initial velocity, or to reduce the velocity whilst retaining the weight of shell, and in both cases as against nerveless dummies the service gun has the best of it.

This brings us to the root of the whole matter, viz., the moral effect of bursting shells against human beings, and the degree of training of the men who direct them. It is quite possible—indeed, it is absolutely certain—that under range conditions, ten 12 lb. shrapnel may and will score more hits on a line of dummies than fifteen 7 lb. shell delivered under the same conditions; but it is by no means so certain that a gainst living targets the rapid bursting of fifteen shells would not produce a greater moral effect, and hence result in a large reduction in the accuracy of the return fire than the ten shells delivered in the same time period. The question does not rest here; it is further necessary to be clear in one's own mind as to what it really is that we require the artillery to do in each successive stage of a general action. First and foremost undeniably comes the attainment of superiority in the artillery duel, and for this purpose accurate and rapid shooting is of chief importance. Burst a shell at the proper height and distance from the opposing gun, and, assuming correct alignment, it will be seen to matter little whether it weighs 7 lb. or 14 lb.; the whole gun detachment will be involved in the cone of dispersion equally well in either case, and the balance of advantage will incline largely to the side which can deliver accurately-aimed projectiles with the greatest rapidity. Next comes the question of either preparing the way for an infantry assault or stopping its advance, and this brings us face to face with factors of quite a different order to those of the practice ground.

Every body of troops, whether infantry, cavalry, or artillery, possesses in itself a certain degree of resisting power, depending on its quality, training, and discipline, and experience has abundantly proved that this power of resistance can be broken down either by a high percentage of loss inflicted in a long period of time, or by a small percentage concentrated into a very short-time interval, and obviously for all practical purposes the latter is the most important to bear in mind. Now, whatever may have been the case with war-seasoned troops of the quality of Napoleon's Old Guard, it is certainly the fact that with the ordinary conscript of European armies to-day

twenty small shells carefully burst in front of an advancing line will create a greater degree of unsteadiness than ten somewhat larger ones bursting within the same time limit, even if the latter actually disable a few more; but we can afford to let this pass as insignificant in comparison to the greater chance of effective bursts the employment of the quick-firer entails. Accurate practice depends on the condition of the nerves of the men who serve the guns, and this again on the cover and physical fatigue involved in the process. This is where the great superiority of the quick-firer lies, and in our opinion all other advantages claimed for the ordinary weapon sink into insignificance beside it. Owing to the absence of recoil the choice of position is widely extended, and where a battery of quick-firers might safely be fought with the muzzles only showing above the crest-line, an ordinary battery would be compelled to fight out in the open simply to avoid the physical fatigue to the men of running the guns up into position on a steep hillside. This point generally escapes the attention of the manœuvre-ground umpire, where blank ammunition only is consumed, but those who have seen the absolute physical prostration which can ensue among a gun detachment in a long-contested action will not be disposed to underrate its value. A man who has once seen his gun numbers fall asleep under a heavy fire, and had to drag them out of the way of the recoiling wheels, carries away with him an impression that time cannot efface; and if in peace-time, in deference to an umpire's opinion, he fights his guns' in an impossible position, he will generally, in the security of his club or ante-room, express his opinion of that umpire's capacity with anything but respect.

For these reasons alone—freedom in choice of position and absence of the labor of running up—we would unhesitatingly vote for the quick-firer, even were it as far behind its competitor as we have above assumed it to be; but actually the gulf between the two has been very largely narrowed, and is likely to be still further reduced in the near future. Aluminum has already been turned out in the United States possessing a tensile strength equal to that of good wrought iron, and since tensile strength is all we require in the anti-recoil jacket, by the use of this metal we could obtain a reduction of weight, together with a diminution in the measurements of the trail and axle rendered possible by the lessened blow of the recoil. This would enable us to turn out a gun of almost the full power of our present twelve-pounder for an equal weight behind the horses. As regards the increased consumption and additional weight of ammunition quick-firers would entail there remains this to be pointed out: ten shells properly placed within one minute will have pretty much the same effect towards winning a victory as fifty shells equally well aimed individually but distributed over an hour in time; and since no gun can or should be discharged except by an officer's order there is a guarantee against waste of ammunition which, from the nature of the case, is entirely absent from the conditions of infantry fire. In all circumstances, therefore, we feel disposed to predict a future for the quick-firing field-gun.—*Army and Navy Gazette.*

REMARKABLE BATTLE CASUALTIES.

Often the army surgeon comes upon a casualty, so curious as to border on the ridiculous. A few remarkable examples were recently given in the

Evening Standard. During the Crimean War, for instance, a man was brought into the field hospital badly wounded in the face. On examining the wound the surgeon was greatly puzzled to find that the lower jaw, teeth and all, was firmly fixed high up in the face. Looking where the lower jaw ought to be, he found a second one there quite intact. He thought, at first, that the soldier was a natural curiosity—a man with three jaws. But further investigation revealed the fact that the third jaw was really another man's property, whose possession had been conveyed to the wounded man by the force of a large bullet. Frequently a fragment of a shell strikes a man in the mouth, scattering his teeth, and many of these organs find a home in other men's arms, legs, and even in their eyes. There was a curious relic at Netley Museum some years ago, which some barbarian has since stolen, consisting of two French coins found in an English soldier's leg during the Crimean campaign. As he was a well-known spendthrift, who never had a penny in his pocket, the discovery was inexplicable until it was found that a French soldier, fighting beside him, had had his pocket and all its contents carried away by a missile. Examples of this kind of accident are very numerous, where soldiers are killed, not directly by bullets, but indirectly by objects which the balls force into their bodies. A soldier in the Franco-German War, who was the happy possessor of twenty gold napoleons, was struck in the trousers pocket, and the whole score of coins were driven into his body. The bullet that killed Lord Nelson entered his shoulder, carrying a piece of epaulette with it—often a fortunate occurrence, for it allows of the bullet being easily withdrawn, but in this case, unhappily a misfortune. Everything that a soldier wears or carries on his person is liable to pass into the body, and the probing of wounds is often like the examination of magpies' nests. Pieces of knives and of watches, of boots, belts, buckles, swords, water canteens, keys, coins, etc., are fished out of arms, legs, and bodies after every serious battle; and no doubt there is many a veteran alive and well who has still some relic in his body of stormy times. A curious case was that, in the American Civil War, where a man was struck on the head and rendered unconscious. He remained unconscious so long that the surgeons suspected that the bullet must have entered his head. Yet there was only a small crack in the skull, through which nothing thicker than a knife blade could pass. One day they found a single hair sticking out, a clear proof that the ball had entered, and, on cutting away some of the bone, saw the bullet reposing within, removed it, and instantly brought the man back to consciousness. If not a curious wound, at least a curious result of a wound was that in the case where an English officer was struck on the head during one of our Eastern quarrels. He received a wound while giving a command to his men, and fell insensible before finishing it. He was taken off the field, brought home some time after, and placed in hospital, being all the time unconscious. But when the piece of depressed bone was raised off his brain, he started up in bed, and in loud tones finished the command that he had begun some months before in a foreign land.

Round balls used to commit strange freaks in the old days. At the battle of Alma a soldier was struck by a cannon ball and fell dead. When

they took him up the huge mass rolled out of his body. It had been stopped by the elastic skin of the back. Spent balls had a singular way of rolling over men's bodies and causing terrible destruction, without leaving any external mark. During the Indian Mutiny a fatigued gunner lay on a gun to rest, the ground being wet. Presently a well-directed ball from the Sepoys passed over his body, cutting away the projecting parts of his vest and breaking his arm, but apparently doing no further injury. Three days later, however, the greater part of his leg fell away. He had not at the time of its occurrence perceived that the ball had pressed heavily on his leg, and he died a firm believer in that very prevalent military fallacy—"windage." A somewhat similar case occurred in the Crimean War, when an officer in the 42d Highlanders was struck in the body, fell, and died while being carried off the field. Not a trace of injury could be seen, and his brother officers came to the conclusion that he died from excitement and "windage." But, on opening the body, it was found that all of the internal organs had been ruptured. Perhaps it is not irrelevant to give one or two of the evidences which clearly prove that there is no such thing as windage. A British officer at the Crimea had his ear carried away and his hair shaved off by a passing ball, but was little the worse for it. If such a thing as windage existed he must have been killed outright. At Bayonne, while an artillery officer was sighting a gun, a surgeon standing close by saw a ball career along, pass between the officer's outstretched legs, and take off the lapel of his coat without his knowledge.

Accidental wounds are numerous in all battles, resulting from explosions, premature discharges, awkwardness of young soldiers, and other things. During the New Zealand campaign the Maories in one engagement, wounded sixty-eight British soldiers, while the British, for some inexplicable cause, wounded ten of their own number. And it is said that during the Crimean War one-third of the wounds treated were accidental. But, no doubt, many of these supposed accidental wounds were really inflicted by the enemy, for there is a widely prevalent belief among a large number of wounded soldiers that they have been shot by their comrades from behind when they have actually been shot by the enemy in front. This is often owing to the curious fact that the first twinge of pain may be felt, not where the bullet enters, but where it comes out. A bullet hit an officer of the 7th Fusiliers at Inkermann in the neck, and passed out behind. He thought he had been pricked from behind with a sword, and turned round to see the officer in his rear fall dead from the same bullet. While effecting a landing, during one of our foreign wars, a soldier turned angrily and asked who had struck him on the back of the leg. He had been really shot from the front and the bullet had gone out behind. At Netley Hospital, after Tel-el-Kebir, there were many men who could never be persuaded but that their comrades had shot them from behind, though the doctors well knew, from the characters of the wounds, that the bullets had entered in front. Pain, in fact, plays the strangest tricks on soldiers. When a bone is broken, or a nerve ruptured, it is intense, but if the ball only passes through flesh the sensation may resemble a blow from a stick or not be felt at all. A great deal depends on the temperament. Some faint, and even die of shock, from

wounds which others scarcely feel. An English officer had part of his finger shot off, and he rushed round screaming with agony, and losing all control of himself. Another had his arm carried away from the shoulder, and rode fifteen miles before fainting. "Like a hit from a sledge hammer," a man wounded by the Lee-Metford rifle said the sensation was. Others say the wound is like the passage of a red-hot wire. In a recent battle, an officer felt a heavy blow on his leg, but did not know his leg was broken by a bullet till his foot fell out of the stirrup and he could not lift it back. A soldier was hit by a bullet in the arm and, at the same moment, a thorn stuck in his foot. He stooped to pull out the thorn, but did not know his arm was wounded till he saw the blood trickling down. A sergeant received a surface wound, two inches long, on the ankle, and, thinking it was an insect that stung him, stooped to brush it away. But the flow of the warm blood told him what had happened. Both legs were carried away from an officer in the Crimea, and the first thing he knew about it was when he tried to stand up, and could not. And often soldiers have arms shot off, or receive other severe injuries, and know nothing about them till told by their comrades. So that, terrible as the carnage is to look at, the sufferings of actual battle are probably not very great.—*United Service Gazette.*

COVER AND SCREEN.

"Cover, Screen, and Illusion" is the title of an interesting paper by Major M. Martin, Royal Engineers, a paper which cannot fail to repay perusal. Major Martin, with the writings of all modern authorities to guide him, is of opinion that strategically a defensive campaign is almost invariably disastrous, small beginnings in the direction of defensive works having a tendency to grow into a purely passive resistance if allowed to control the plans of commanders. Tactically it is equally true that excessive resort to defensive works and cover has not unfrequently caused a paralysis of offensive vigor, a thing to be guarded against. Engineer as he is and apt as he might be to defend defensive works, Major Martin holds that tactics absosolutely overrule field engineering. He goes further, and asserts that field cover and its provision or utilization is not the exclusive function of technical experts, but a part of the fighting tactics of all three arms whenever applicable to the tactical purposes immediately to be pursued. "Master the spirit of tactics," it has been said, "and the details of defense will come of themselves." Admitting the full force of this reasoning, Major Martin seeks to lay down one or two principles bearing immediately upon the subjects embraced in the title of his paper. It is always gratifying to follow the arguments of a large-minded man, and our author shows himself to be that. Of course, the first thing to be considered is cover. The details of field cover, it is held, need absolute modification from time to time as progress is made in modern artillery. To quote the words of the paper:—

"The causes of revolution are chiefly increased accuracy and range, but 'cover' itself is more affected by the greater power and penetration of projectiles, by improvements in fuse ignition, by the use of high explosives, and by the probable use of howitzers with more curve in the trajectory and throwing more powerful shells, common and shrapnel."

Smokeless powder will give some slight extra concealment to both sides from counter observation in the next war, while generally increasing the accuracy and rapidity of artillery fire by the removal of the obscuration of the smoke. Formerly in artillery duels the guns themselves suffered comparatively little loss. The men and horses have suffered much, and these have compelled the withdrawal of the guns usually uninjured. But with high explosives it will be more common for the guns themselves to be destroyed. These are points upon which stress has to be laid, for they naturally will produce a considerable effect on all matters of cover. Major Martin complains that forest defense is a question too little studied and provided for in our service. It is often recommended to form clearances which would involve felling acres of trees. Yet our British battalions have few axes, and even were supplies available when required it is doubtful whether the game—of forest-felling—would be quite worth the candle. Canadian or Australian lumbermen or backwoodsmen would give excellent results if they could be brought into acquisition, but the capacity of "Tommy Atkins" at tree-felling—a trade in itself—is reasonably doubted. Foreign armies have a larger element of forest-born recruits, better fitted to deal with such eventualities than our own—for the most part town-bred youths. Is this taken sufficiently into account? On this head we read:—

"We can never be sure a future campaign will not be in forest country, and it would appear advisable to develop the existing organization of infantry pioneers so as to act as instructors to a larger proportion of the bulk of the infantry. This system is, indeed, laid down in the Queen's Regulations, but little has been found possible, far less has it been found feasible to develop further the system of instruction foreshadowed."

In this connection Major Martin is undoubtedly right when he questions whether the pick and shovel are the sole tools useful to our infantry. In many cases he maintains that axes and saws would be far more to the purpose. In a loose sandy desert, for instance, such as British troops have had so much experience of in late years, of what practical value would a pick be? The conditions and circumstances of the scene of campaigning govern to a large extent the instruction which is necessary and equipment to be provided. As Major Martin reminds us:

"The defenses of Plevna caused the Russians to raise their artillery force to the proportion of eight guns per 1000 infantry, an almost unheard-of average, and when the march on Constantinople commenced and continued, a large proportion of this artillery had to be left behind. It is probable, therefore, that in future wars every effort will be made to bring a very large artillery force into action in the first engagement, especially against a defensive position, and this force will, it is said, comprise besides howitzers, guns stronger than ordinary field or even position artillery. Besides the weight of such guns themselves, increased power in shells means increased difficulty in transport, and the heavier natures of ordnance may have to be abandoned if the subsequent campaign becomes one of march and manœuvre."

Such conditions will react on cover and affect its use, so that it is not a subject to be lightly dismissed. Our own army has had no recent ex-

perience of meeting artillery fire in the field, and it will require not only great forethought, but will form our first consideration how to deal with the artillery phase of the action, utilizing cover as tactics may dictate, and never forcing the tactical consideration into subordination to academic perfection of defensive details.

Major Martin offers three suggestions, all of which must recommend themselves to the thoughtful student :—

"First, to eliminate from our books and courses of instruction all models and details which have become not only obsolete but positively dangerous; second, to carefully discriminate between war against a savage enemy consisting of infantry alone, or infantry and cavalry; and third, it would appear that these details of cover should be dealt with more in a tactical spirit and with reference to the two kinds of warfare in separate volumes, as otherwise one paragraph must be corrected by the next to qualify the use for which any particular model is suitable."

Screens are formed frequently enough of cavalry, light troops, or of all arms. A good illustration of the advantages of screen is furnished by the action of Tashkessen, which is further interesting as the last occasion on which a British officer commanded in action against European troops. We will let Major Martin tell his own tale :—

"The causes that led to this action may be rapidly summarized. Shakir Pasha with a Turkish army corps was holding the pass through the Etropol Balkans served by the road from Orkhanie to Kamirli, at which latter position his force was entrenched. After the fall of Plevna, Gourko succeeded in turning this pass by utilizing the mountain paths by Tchuriak, and debouching on the plain succeeded in threatening the retreat of Shakir on Petric. To delay Gourko, General Baker, with a small force of 3000 men and five guns, took up a position at Tashkessen and forced an action, although his position could have been turned. As it was only necessary to hold out till the evening of December 29, 1877, Baker occupied two positions, a false one in advance, and a real one a mile in rear separated by a valley. To his great joy Gourko deployed nearly 40,000 men and three batteries to attack the false position, sending a division to each flank to thoroughly envelop it, and the hope then occurred to Baker that if these large forces arrived massed and disordered in the advanced position (really a screen) he might from the real one be able to repulse them, though the odds stood at 12½ to 1. Baker's original plan was the defense of successive positions, but the one suggested by Gourko's premature attack was evidently better. The attack began at daybreak, and by half-past 12 Baker had retired to the main position which was entrenched, having 4½ hours of daylight to hold out, and the attacking force being clumped and difficult to extricate for even a fresh front attack, still less to form fresh flanking columns. Baker's position was on both flanks of the road, commanding which was a strongly-built 'khan,' or traveller's 'serai,' fit to resist field artillery, and in which he placed four companies. Close by in a yard he hid two mountain guns, which, being masked, acted subsequently with the force of a surprise. On his left his battalions were able to entrench and used the Turkish trench. This form had been found capable of withstanding both

infantry and artillery fire and cannot easily be improved upon. A small shelf, or 'berme,' however, might be added near the crest, to rest the elbow on, give better cover to the man, and hold his loose cartridges. It is necessary to avoid allowing this trench to be made too deep as the men then sky all their cartridges. On Baker's right the ground was too stony to trench, but he permitted the erection of stone walls, which he knew would be harmful under artillery fire, sooner than lose all protection against bullets. In the case this was a wise decision, but each case must stand by itself, and here a great portion of the Russian artillery was diverted to Kamirli. The defense held out till nightfall, and after losing about half of its total force had sufficient vitality to repulse a final charge of the Russian guard with the bayonet after an action of ten hours, which combined active manœuvring with a very trying passive defense. Baker here employed cover, screen, and illusion, and gave a further instance of the last before his retirement during the night. The opposing sentries were only at twenty yards distance, and the Turks substituted dummy ones with perfect success and effected their junction with Shakir at Petric unmolested. It turned out afterwards that Gourko had further been deluded by telegrams found in the office he seized into supposing that he had the main Turkish force in front of him, otherwise he could have easily retained Baker and spared a force to seize the Acha Kamirli defile and cut off Shakir. Since the Russo-Turkish campaign artillery has made enormous advances, and if at that time it was several times possible to compel the surrender of large bodies of men entrenched by shrapnel fire alone, the possibilities of its future action are hard to over-estimate."—*The Army and Navy Gazette.*

THE TEST OF LONG RANGE FIRE.

In order to test the efficiency of infantry fire at long ranges under certain circumstances, an experiment was made in Switzerland by firing from the hamlet of Replands, at an altitude of 3760 feet, at a surface of snow, about a mile and a quarter off as the crow flies, at the foot of the Mont de Baulmes. The target was a rectangle 165 feet wide by 200 feet deep, sloping at an angle of 10 deg., and was marked at the four corners by flags, and rendered more conspicuous by a piece of black cloth, 8 feet by 10 feet, spread at the base of the rectangle. Fourteen medium shots were told off to fire independently a total of 500 carefully aimed shots within sixteen minutes, between 2.15 and 2.31 P.M., the weather being very fine, with bright sunshine and a dry and perfectly calm atmosphere. The thermometer indicated 20 deg. Fahrenheit. The snow was hard frozen, smooth, and free from any mark, and the slightest graze of the surface was distinctly visible, so that every hit could be clearly traced. It was found that out of the 500 shots, 338, or 67 per cent., had hit the target, besides twenty which had struck above, and twenty-six which had struck below the rectangle, within a radius of about 30 feet. The remaining shots struck within about 100 yards, either short or over the target, while a very few had deviated sideways.—*La France Militaire.*

CAVALRY SCOUTS.

The *Invalide Russe* has recently published new regulations concerning

the constitution of the special body of cavalry scouts, which have been approved by the Czar on the advice of the Council of War. This is a matter that has long received very careful attention in Russia, where it is maintained that the work of scouting can only be confided properly to picked men, of assured intelligence, physically vigorous, with keen sight and excellent hearing, who have been subjected to special training. Of such selected men sixteen will serve with each squadron, and will receive the prescribed instruction, which will be given also to all non-commissioned cavalry officers. In order that the best men may be secured for the service the principle of selection will operate continually. Those who prove inapt will be replaced by others, while men who display high powers during a continued period will receive a special badge on the shoulder-strap, and will enjoy particular advantages. Great care is bestowed upon the mounting of these scouts, and their training is directed in each squadron by an officer selected for his special interest in scouting and his physical aptitude for the work. One advantage given to the scouts is that, after two years' service, they will be promoted as supernumerary non-commissioned officers, without having gone through the special training for the grade, on the condition that they remain on the roster for scouting duties.

THE JAPANESE RIFLE.

With regard to the rifle used by the Japanese and the nature of the wounds caused by it, Captain Elliott goes on to observe: "All rifles are made at the arsenal in Tokio and are called by the inventor's name Murata. They are of two patterns. The one used by the great majority of the troops was a single-loading bolt gun of .44 calibre, sighting to 1400 m. without wind gauge; the other a magazine gun of .315 calibre. The stocks are very short and the cheeks wide." As to the effect of the rifle bullet wounds Captain Elliott reports: "While in Tientsin, China, I visited several times the hospital under charge of Dr. Irwin, surgeon to Viceroy Li-Hung Chang. Wounded Chinese soldiers were treated here during the winter. Surgeon-Major James, of the British army, had charge of some of the wards, and was much interested in wounds made by the small calibre, enveloped bullet. He kindly gave me every opportunity to see and much information in regard to these wounds. I saw about thirty of the wounded. In no case were bones shattered to any extent, even at the exit of the ball. The puncture was clean; no bullet was found in the patient, so that casing was unknown, whether of steel or a softer metal. They did not seem to deflect on striking, but cut their way through in the line of flight. Thirty patients testified they had received their wounds at distances varying from 150 to 400 yards. They healed readily, often by first intention. None of the wounds were in the leg, for the men had made their own way from the battlefield on foot or in carts to the railroad, more than 200 miles, and were several weeks on the road. All suffered more from frost-bitten feet than the bullets. Out of the thirty cases I saw I think probably the old .45 calibre lead ball would have left on the field nine of them dead."

TRAINING OF BICYCLISTS IN GERMANY.

The *Militär Wochenblatt* has recently given some particulars of the

Fahrrad-Vorschrift, or instruction concerning the training of bicyclists in the German army. The first part of the instruction is a description of the machine, which, as we learn from the *Deutsche Heeres-Zeitung*, is a small safety with 1½ in. cushion tires, there being two types, one of strong build for training and the other of lighter character for use in the field. The second part of the instruction relates to the care and cleansing of the machine, and the third to training. The *Wochenblatt* informs us that the period of training is divided into three parts, and that the number of men under training will be in the proportion of three to each available machine. Preliminary work begins in October, so that before the winter comes on the man is at home on his machine, and his practice is kept up during the winter months by two hours' practice weekly. From March onward the second period of the training is to fit the man to have perfect control of his machine, so as to be able to gain the full use and advantage of it. He is thus to be competent for military cycling duties during the manœuvres. Hand in hand with this work the third section of training—the theoretical—goes on. It relates to the building and repair of machines, the disposition of weights, the carrying of the rifle and revolver with which the military bicyclist is armed, precautions to be taken in regard to heat and cold, the police regulations of various towns, and so forth. As will be seen, the instruction is concerned with the training rather than with the employment of the bicyclist. It concludes by saying that a number of men practically trained upon the lines laid down will soon render it unnecessary to employ civilian riders, which has hitherto been done, during the manœuvres.

A NEW NAILLESS HORSE-SHOE.

So many kinds of nailless horse-shoes have been found wanting when subjected to exhaustive trial that we have hitherto refrained from giving any opinion on the "Minerva" shoe, which has called forth so much comment in the press. It has been known for nearly a year that General Von Wittich, the commander of the 11th German Army Corps, has been experimenting with it, but what his views were had not until recently been made public. He has now stated that the results are very satisfactory, and has given an order for a further supply of the shoes. This is thought to justify some inquiry as to the merits of the invention, and that opinion is confirmed by the fact that the pattern has been placed in the museum of the Royal United Service Institution. It can there be examined by officers of the mounted services and by horsemen in general. Several veterinary authorities and other experts have positively asserted that the invention solves the nailless problem, which has baffled all previous inventors. There is also a large amount of testimony in its favor from horse owners who have used the shoe during the past twelve months. Briefly, we are told that, while holding tight and firm in its place, it yet allows the hoof to expand naturally, it obviates the possibility of pricking or pressing on the sensitive part of the foot, it wears longer than the ordinary shoe, and can be put on or taken off by an inexperienced man. If these claims prove to be well founded it is evident that we are about to be furnished with a shoe, the value of which for military purposes it would be difficult to overrate.

In this instance the Royal United Service Institution is, as usual, in the van of progress. It is to be hoped also that the military authorities will deem the matter of sufficient importance to order trials of the shoe in various branches of the service.—*Army and Navy Gazette.*

THE EFFECT OF ELECTRICITY ON THE FLIGHT OF PROJECTILES.

The Committee of the Federal Shooting Association made a curious discovery lately in tabulating certain results of shooting. It observed that on the range at Winterthour the majority of shots fired at the targets on the right of the range struck to the right of the bull's-eye, while on the targets on the left of the range the greater number of hits were to the left of the bull's-eye. It was further discovered that all the projectiles constructed either partly or wholly of steel had become magnetized during flight.

The Federal Experimental Committee having had these facts brought to their notice, thought that possibly they might have some connection with the existence of the numerous wires used for electric bells and telephones on either side of the range. Several additional experiments were made on other ranges, and the results fully bore out this theory.

An electric current of 8000 volts was installed on the range at Thun by means of four 18 mm. cables laid parallel to the line of fire and 40 m. from it. In order to define the trajectory, screens of thin paper were fixed at every 10 m. along the range.

The first trials were made with the 1889 pattern rifle. The influence of the electric current made itself felt at once; at 260 m. the lateral deviation was already 24 m. The trajectory showed a very remarkable curve towards the electric current.

A second trial was made with the Japanese gun of 3.3 mm. invented by Colonel Yamagata. The minute bullet went straight for the electric wires, broke two insulators, and followed along the wires, finally wearing out its energy with the friction.

Experiments were then made with artillery. The results obtained were no less startling. The range was 3000 m. and the electric current was installed as before, commencing at 2800 m., *i.e.*, 200 m. in front of the target. The lateral deviation of the shell (common) was 14°. Firing with shrapnel produced even more curious phenomena. The head of the projectile, carrying the fuse made of a non-magnetic metal, was completely detached, while the body was attracted by the current, the bullets after burst showing such extraordinary variations that all accuracy of fire was totally done away with.

It was proved by these experiments that the force of attraction increases in inverse ratio to the weight of the projectile and also to its velocity. A section of infantry exposed to the fire of hostile infantry at 300 m. and having on one flank an electric current (by means of a dynamo or accumulators) would have nothing to fear from the enemy's bullets. A company at 500 m. could be protected in a similar way, and a like arrangement would be a safeguard from artillery fire at from 900 to 1400 m.—*Journal de Genève. Captain W. C. Hunter-Blair, R. A.*

Comment and Criticism.

I.

"Congress and the National Guard."

First Lieut. W. E. Birkhimer, 3d Artillery.

UNDER this head I note in the last copy of the JOURNAL a continuation of the amiable contention between Colonel Rice and myself that has found space in the columns of that periodical at various times during the past two years. The point in dispute has been whether or not the National Government can safely trust to State militia, temporarily called into the service of the United States, for general war purposes, the Colonel taking the affirmative and I the negative of the proposition. Some other questions have arisen as merely incidental to this; but they were treated, as they are, as of wholly secondary importance.

The Colonel's last article, evidently for the congressional eye, does not call for extended notice, on my part, notwithstanding references to myself that bordered on the personal; rethrashing old straw one's self or furnishing another an excuse for so doing is tiresome to intelligent readers, and not to be encouraged in professional papers. Moreover, the injection of even a suggestion of the personal feature into such papers at once removes them from the domain of legitimate professional literature.

One reason why militia have not been regarded as reliable in the contingency mentioned has been the danger which in times past has existed, and now exists, that a governor, who is undeniably Commander-in-chief of the militia of his own State, may not respond promptly to the call of the President. As the only new feature in the Colonel's latest paper is the graphic manner in which he demonstrates how and why this fatal difference of opinion between these two high officials may arise, thus to this extent confirming the views upon this point that I heretofore have urged, I will confine my present remarks to this branch of the subject.

A governor would not refuse, observes the Colonel, to honor the requisition of the President for troops unless the war was decidedly against his own judgment, and that of his people. This, I think, concedes everything that those contend for who maintain that troops who for these reasons may be withheld are not such as the general government can rely upon to fight its battles. The Government of the United States is no such rickety affair as to depend for existence upon the peculiar views of the necessity of the war held by the governor of a State. The experience of the Colonel's own State in 1894 during the Chicago riots affords light, if not upon this, then upon a kindred subject. The gravity of the then situation regarding the peace of the country and the stability of our institutions was generally recognized by thinking people; and certainly very recent events have emphasized the admitted fact, that in dealing with the condition of affairs at Chicago fundamental principles of government were involved. Yet what do we behold! The governor of a State, in which this condition of affairs existed, protesting against the action of the

President in sending United States troops to enforce there United States laws. Here was a clearly cut case of a radical difference of opinion between these two officials upon a point vital to the interests and peace of the country. Can we presume that war might not develop a similar disagreement? Who in this country that has been a close observer of events during the past two years will assert that during a war such fatal difference of opinion is unlikely? Is it to be maintained for one instant, that the President, in prosecuting a war, is to be placed at the mercy of a State governor who, as the Governor of Illinois did, may differ from him regarding the wisdom or necessity of his war measures. And be it remembered that United States troops were not sent to Chicago until the Federal judicial officers had represented that the process of Federal courts could not be executed through ordinary means, and proof furnished that conspiracies which otherwise could not be suppressed existed against commerce between the States. Yet not only did the governor protest against United States troops being sent there, but he has since protested that their presence, far from exerting an influence for good, served only to excite and irritate the populace.

Is, then, the United States to be turned over bound hand and foot in the hour of peril and trial to such governors? Never! If so, then, as well expressed by President Madison, the United States is not a government for the purpose most of all demanding it. The Constitution does not leave the United States in any such predicament. Congress shall have power to raise and support armies. That is the emphatic language. The taking the militia of the States into the temporary service of the Federal Government is an altogether different matter, in which, as experience has shown, and as avowed by Colonel Rice, the will of the Commander-in-chief may be thwarted by the governor of a State.

In referring as I have here done to the Governor of Illinois, I intend no disrespect. The facts herein cited and so well known serve to accentuate the point here sought to be emphasized. That the governor is a conspicuous politician; that he stands high in the councils of one of the great parties of the day; that except for the accident of foreign birth he would, as the Colonel informs us, have been a candidate for President; that he was, as the public prints inform us, overwhelmingly defeated in the second race for governor, neither fact has, nor have all combined any influence in this argument, in which he is treated as possessing all the virtues and attainments that could adorn his high station. The simple fact alone is considered that, upon a matter of vital importance in a governmental crisis he resolutely and uncompromisingly set himself in opposition to the military measures of the Federal chief magistrate. And from thence the inference naturally follows that State troops, of which such a governor is the Commander-in-chief, do not form a force upon which the Federal Government can depend to vindicate in war either its integrity at home or its honor abroad.

In conclusion I have only to remark that the Colonel, in referring to the expedition of General George Rogers Clark, in 1778, beyond the Ohio, as an invasion of foreign soil, certainly departs from his usual accuracy. That territory was claimed by Virginia, as part of her soil, long before Clark's expedition of 1778. In various Virginia laws of anterior date, this was avowed. General Clark, therefore, in expelling the British, was doing no more from a Virginia stand-point than driving an intruder from her territory. The evidence of this is manifold: but it comes out conspicuously in the Act of the Virginia Legislature organizing "Illinois" into a county and giving it a government. The preamble of the act recites that these British posts had been held by the enemy within the limits of the Commonwealth, but the British had now been expelled. Moreover, all Virginia laws before this, touching the militia, had explicitly stated, whenever the subject was mentioned, as it frequently was, that they were not to be used beyond the territory of the colony.

Presidio of San Francisco, Cal.

November 12, 1896.

II.

"The Sioux Campaign of 1890-91."

First Lieut. H. L. Hawthorne, 1st. U. S. Artillery.

I HAVE hesitated to make myself again a mark for the personalities of the writer of the JOURNAL article on the "Sioux Campaign of 1890-91," but the complete support which I have received from other eye-witnesses of the fight which he so badly describes permits me to insist that Lieut. Richardson's account is very misleading.

Of the nine items to which objection was made, Lieut. Richardson defends five, thus allowing the remaining four to fall within the category of "wholly imaginative." Lieut. Richardson denies that he charged the Seventh Cavalry with entertaining a feeling of revenge and yet he wrote "I am not inclined to withhold some justification to the 7th Cavalry, who *still carried the memory of Custer and the Little Big Horn.*"

The map to which Lieut. Richardson refers was constructed by an officer who was present, and the dispositions of the troops shown were made on the combined recollections of most of the officers who took part in the fight. From Lieut. Richardson's study of this map, he thinks that some of the soldiers were killed by the fire of their comrades. The officers who saw the fight and who helped to construct the map declare that no such thing occurred. Lieut. Richardson could have easily secured this evidence before he wrote his history, for the asking. He prefers the second-hand testimony of Indians. An officer says "I studied the dispositions and positions of the troops and I could not see how they could be better disposed on that ground to accomplish their purpose than they were." The fact is that Lieut. Richardson is publishing camp tattle, the source of which was questionable in the beginning and which received its quietus years ago.

On the question of prepared resistance, Lieut. Richardson asks why the Indians gave up 48 guns before the rush began, intimating that they were thus weakening voluntarily their power to resist. One of the officers who found these guns states that they were "about 31 or 32 old 'squaw guns,' some of them were muzzle loaders, the old Yager or squirrel rifles, and scarcely any ammunition." The Indians must have regarded the loss of these with complacency.

In the original paper Lieut. Richardson says that the Hotchkiss gun continued to fire long after resistance ceased. In his "Reply" he says that he stated that "firing continued after resistance had ceased." Both statements are incorrect. An officer testifies, "The last shot fired of that fight was fired by one of Big Foot's band and killed one of Captain Jackson's men."

As to the character and attitude of Taylor's scouts, I cannot see what the splendid service of the Indian Police at Standing Rock has to do with them. Lieut. Richardson might just as logically have challenged me to beat the record of Pocahontas. An officer says laconically of these scouts, "They were no good." Another says "One of them shot at me the next day, and some of them yelled friendly messages to the hostiles." Such testimony ought to shake the gullibility of the most ardent Indian admirer.

Describing the fight, Lieut. Richardson says, "185 Indians were reported killed and a few were taken wounded into Pine Ridge." Any reader, I am sure, would gather from this that these 185 were killed on the field; whereas the writer meant that, in addition to the "few" who "were taken wounded into Pine Ridge," there were also quite a number of the "185 killed" who were taken wounded into Pine Ridge and who subsequently died, some probably from the severity of their wounds and some certainly because of refusal to receive proper surgical treatment. The author's mingling of the final and the im-

mediate results was the reason for my criticism on this point. 135 seems to be about the probable number of those killed on or near the field.

Major Whitside, who made the capture and who counted the warriors in line of battle gives their number as 120.

The only point in which there is a disagreement in the recollections of those who took part in this fight with whom I have corresponded is the number of soldiers engaged. None agrees with Lieut. Richardson, all giving figures below his and making his estimate of "more than four times" the number of Indians an erroneous one.

Reports of secretaries cannot teach the eye-witnesses anything concerning the events of that day. There is no necessity for writing a correct history of that bloody struggle. Care should be taken, however, to check writers who decline to get testimony at first hand, but are contented to obtain inspiration from "well known facts," nameless "reliable sources" and the artful Red-man, especially if he be anxious to present the Indian's "side."

III.

"The Status of Medical Officers."

"THE difficulties encountered by the artillery in solving the problem of the proper status of their associates of the medical department would be lessened in some degree by a preliminary elimination of the personal equation," writes Major Kilbourne in the September number.

This gentleman may, perhaps, not be aware that the pamphlet which called forth a partial reply in the March number of this journal contained a distinct attack on the artillery arm of our service. The author of the pamphlet endeavored to show that in Russia there had been a certain development in the artillery and engineers from a nearly civil status to one only partially military even at the time of writing. From this statement of facts he proceeded to excuse or give reason for a similar form of development in the medical department of our own army. The author found himself obliged to wander rather far afield in his endeavor to find a present example of such development, which, by the way, was not quite correctly stated even then, for the reorganization of the Russian artillery, with the Grand Duke Vladimir at its head, had placed that arm in a position similar to what it holds in all other services. This took place some time previous to the appearance of the pamphlet in question.

A reading of this portion of the article naturally leads to the inference that a similar development had taken place in our own service, and that this again aided the argument; and herein lay the sophistry and herein the attack. That no such change has taken place in our army, either regarding the artillery or engineers, is too well known, among those who know anything of such matters, to admit of question—a legistator, however, might not know.

Formerly, in fact, when the engineers and artillery formed one corps the status of the artillery was much better in every respect than at present. Many claim that when the engineers and ordnance divorced themselves from the artillery they not only took most of the influence and many of the most talented officers, but they also took more than quite a just share of employment and prerogative, and left this arm in a position from which it has never recovered—a body without a head, and without much voice or influence regarding questions which in other countries fall to it as a matter of course.

We enter upon these details to show justification for the reply, and to indicate how ill-suited was the pamphleteer's argument to the case in point, especially when we consider to what the argument led, namely, an attempt to obtain eligibility to command

over line troops and other staff corps by the indirect means indicated in the pamphlet, a means which naturally roused the ire of those affected by it.

Because a certain development had taken place in the Russian artillery did not in any way warrant a similar one in the medical department of the U. S. Army, nor was the inference just that any such progression had occurred in respect to our own artillery force.

We hardly need the reminder "that an army is organized for war"—not for promotion—in fact it was with this idea in mind that we ventured to demur, mildly as became our station, against abnormal development to the detriment of the fighting element. It is exactly here that the crux of this whole question finds itself, so to speak.

An army properly organized for war must possess its various elements in harmonious proportions. If it have more artillery, for instance, than the exigencies of the case demand, the whole body is hampered by such excess; so too with the medical element, if the zeal of its officers for self-advancement has been carried beyond the bounds of equity and a just regard for the principles of military economics, then others suffer in just such proportion as these limits are exceeded or principles disregarded, and we firmly believe this to be the case to-day.

But our critic contends, "that equity demands for the medical officer a compensatory recognition of the lack of assistance in the preparation for its service. It has been freely accorded in the form of rank." There can be no doubt about the accuracy of this last sentence; but has not the medical officer already been properly compensated upon entry into the service?

In order to obtain certain properly fitted officers, the Government offers a professional education to a carefully selected number, who are to devote their lives to its service, if need be; to the medical officer it offers the position of assistant surgeon with rank of first lieutenant of cavalry, thereby placing him at the start above about 450 officers already in service, besides the pay, which is considerably more than young doctors usually receive on their first appointment, and some time thereafter. This is sufficient compensation, and there is no reason why they should thereafter be promoted faster than engineer or ordnance officers.

That rank has been "freely accorded" is abundantly shown by the careers of the two gentlemen in question. The writer of the pamphlet entered the army in Nov., 1874. When he had attained five years of service, and, thereby, the rank of captain, he passed over the heads of some 300 officers, a goodly number of whom, in all branches of service, had been serving under fire in the late war at a time when this young medical officer was hardly out of short clothes. He received his majority in June, 1891, and superseded 180 captains by the operation, a total of 480, which even in our small army might be considered quite a respectable pair of jumps. Many of these captains had rendered distinguished service during the war and since, but nothing availed to save them from the humiliation of being outranked, outpreceded, and dominated, in a *military* sense, at every court, board and function by an officer from 14 to 17 years their junior, simply and solely because he was a *medical* officer. He must be "compensated," no matter at what cost to others who must suffer as a result of such compensation.

The other gentleman entered in June, 1875, and attained his majority in Feb., 1894; and while his case may not afford so marked an instance as the other, it offers no such material difference as to occasion remark.

Can any one imagine a better deadener of professional soldier pride and military spirit than such examples afford? We cannot.

The engineer officer who graduated at the head of his class in 1875 did not attain his majority till well into 1896. Recently a former line officer who entered the army the same year, and who obtained his educational equipment without expense to government,

received promotion to a majority in the quartermaster's department, and another line officer who graduated in 1875, after distinguishing himself by unusually hard and successful work in the line of his profession, received appointment as major in the Adjutant-General's department. These examples are typical in more ways than one, and the promotions rapid, but the medical officer of corresponding date ranks them all by at least two years, and fifty files in relative rank.

If we compare the total pay received by these medical officers with that of engineer or ordnance officers of their own date, we will find abundant reason for thinking that they have received sufficient pecuniary compensation for having had the goodness to provide themselves with a professional education, while if we pursue a similar course with reference to line officers we will find a difference fully equal to supplying the means for more than one medical equipment.

And yet the craving for "compensation" is not satisfied, and these gentlemen have now added a demand for eligibility to command over their less fortunate military brethren, whose professional soldier prestige excites their cupidity. Verily medical equipment "comes high" in these days of large endowments and abundant educational facilities.

Among medical officers there are some half dozen who endeavored to maintain a place in the military competition at West Point. Failing, they adopted a profession "whose *raison d'etre* has nothing in common with that of the profession of arms," according to Surgeon-Colonel Hill-Climo. These gentlemen are the only ones among medical officers who can claim to have received military knowledge or training. If these were properly declared unfitted for the profession of arms, how about the others?

Eligibility to command outside their own department has not been conferred upon medical officers as claimed, and all the "maintaining" in the world will never make such a step either just or proper.

No wonder that Surgeon-Colonel Hill-Climo should declare that there was no end to it, that one demand simply led to another.

An English officer of rank once said to the writer: "If you treat your fighting element relatively badly in time of peace, if you confine the officers to subordinate rank during the best part of their lives, where they can cultivate no initiative or independence of judgment, how can you expect that they will serve you well when the time of trial comes?" What incentive to military excellence can there be among professional soldiers if at last they are to find themselves commanded by a set of medical officers who have obtained excessive promotion simply by way of "compensation" for the relatively paltry consideration that they have furnished the means for their professional education before entering the service?

If our army were organized mainly for sanitary purposes, it would be perfectly just to accentuate the sanitary element, but if it is, as stated by our critic, organized for war, then it is the professional soldier element that may justly claim primary consideration.

Reviews and Exchanges.

Personal Recollections and Observations of General Nelson A. Miles, U. S. Army.*

THE "Personal Recollections of General Nelson A. Miles," published by the Werner Company of Chicago has been awaited with pleasant anticipation by the many personal friends of the writer to whom the charm of a personal narrative emanating from so distinguished a source is added to the interest attaching to a chronicle of stirring events embracing a wide field of adventure.

It has not been the author's intention to write a memoir or history but rather, as he states, to retrace with his readers some portions of the journey of life and to illustrate the difficulties and dangers to which companions in arms have been exposed, in order that, if possible, their services and achievements may be more fully appreciated by the beneficiaries who are now enjoying the fruits of their heroism and sacrifices.

In the chapters devoted to Indian fighting the dispassionate judgment of an eye-witness to the terrible scenes described, which gives strength and authenticity to the narrative, should go far both to modify the views of unwise sentimentalists and temper the animosity awakened by many a barbarous massacre.

The book opens with a thoughtful retrospect of colonial life and character and the youthful impress made upon the author by a perusal of New England history, resulting in an adherence to the profession of arms as his chosen pursuit. The almost invariably hostile attitude of the Indians towards the white settlers is traced from the earliest period of American colonization, and the gradual occupation of the far West consequent to exploration and acquisition of new territory, together with the vicissitudes of frontier life and the hardships to which pioneer emigrants were subjected—these and many other incidents of the period are narrated with the clearness and fervor of an actor in the drama of national progress.

The period of the war is touched upon with comparative briefness. One personal episode at the beginning, modestly told, stands out and sounds probably a note of after success. He had raised some three or four thousand dollars which was devoted to recruiting a company of which he was chosen captain, and duly commissioned. The evening before the regiment left for the field the Adjutant-General of the State came from the governor and demanded the return of the captain's commission and acceptance of that of lieutenant instead. Many another would have thrown up the appointment in disgust; not so our author, who writes:—"As I had engaged in the service against the enemies of my country, I did not propose to abandon that service to engage in a contest with the governor of my state, however just my cause, though I certainly regarded the position he had taken as unwarranted, I, therefore, began my military career as a captain reduced to lieutenant."

After his severe wound at the battle of Chancellorsville, General Miles was obliged to remain away from the field for a time, but recovered sufficiently to take part in the autumn campaign of 1863 and that of the Wilderness the following year and again in the final

* *Personal Recollections and Observations of General Nelson A. Miles, U. S. Army.* Copiously illustrated with graphic pictures by Frederic Remington. The Werner Company, Chicago-New York. 1896.

campaign of '65. During the latter portion of this period he commanded the First Division of the Second Army Corps, and for a short time in Feb. 1865, the corps itself. The surviving members of Hancock's old corps will read with pleasure the glowing tribute to that splendid organization, the number of whose engagements inscribed upon its banners outnumbered that of any other corps of the army, and whose captured battle-flags outnumbered its engagements. The chapter devoted to the last scenes of the war notes that the first proposal for a surrender came to the general's own lines, though the culminating scenes were by accident shifted to another point.

When the Volunteer Army disbanded the author was commissioned colonel of the Fifth Infantry, with station at Fort Hays, Kansas, and thenceforward continued to serve west of the Missouri until the fall of 1890, a period of twenty-two years. "During this period," he writes, "I have been an interested witness of the transformation and marvellous development of that vast region. Within a quarter of a century following our great war a new empire has sprung into existence. What was at one time a vast desert plain, wilderness and mountain waste, has been transformed into a land of immeasurable resources, a realm rivalling in extent the empire of the Cæsars."

"Looking backward but a few years, I, myself, having witnessed all the processes intervening between the tepee and the town, am astonished at the change. In the weariness of the march, the loneliness of the camp, and the excitement of the fight, the soldier of the Western campaigns was not aware of the flood of energy behind him, whose barriers he was breaking and which followed instantly when he led the way."

Probably to most readers the interest of these valuable reminiscences will centre in the six years of Indian campaigns in which the writer was actively engaged. The territory covered by military operations extended from the region of the Yellowstone to Mexico and Texas, and the scenes enacted on this huge theatre are described with a grim fidelity to fact. The hazardous exploits performed, the sufferings from cold and hunger and the heroic conduct of the troops throughout a warfare in which all the Indian's implacable hatred and thirst for vengeance were constantly displayed, are narrated in a way to hold the reader's attention to the end.

Regarding the fate of the Indians, General Miles writes: "He was never destined to remain in the position of barring the way of a mighty civilization. The wrongs he has suffered are inexcusable and his destiny is one of the saddest in human history. He might have yielded most that he has lost and still have been treated fairly, still have had the promises made him fulfilled. But between him and all broken contracts and all changing policies, the soldier of the United States has been required to stand. That stand is now a matter of history. The result alone is seen."

Prominent as is the subject of the Indian and his subjugation and control, General Miles' story is by no means limited to this theme. He writes instructively of the "Arid Region and Irrigation," showing the almost marvellous achievements resulting from systematic and scientific effort at irrigation in reclaiming waste lands, also of "Transportation" and "California." Even remote Alaska and its unique people receive recognition in these extensive recollections, the same thought and observation being here as elsewhere discernible.

The handsome likeness of General Miles, which forms the frontispiece, and the many portraits of prominent generals and other companions in arms, together with those of Indian celebrities, lend additional interest to this sumptuous volume, which is further admirably illustrated by the graphic sketches of Mr. Frederic Remington.

The book is handsomely printed and the publishers have given it a dress quite in keeping with its distinguished character.

M. T.

Water-Supply, Chemical and Sanitary.*

Professor Mason prefaces his work with the announcement that compilation must of necessity enter largely into his undertaking ; and that tabulations, with frequent references to the findings of other investigators, naturally form no small portion of the body of the text. He hopes that his book may prove of interest to classes of men widely separated in tastes and occupations : the physician, the hydraulic engineer, the water-analyst, and the general reader.

His hopes are certain of realization, for all classes named will find compactly drawn up and well classified, a mass of information heretofore diffused through many publications, and the conclusions deduced therefrom. A professional work, it is replete with interest for anyone who would be well-informed on matters of import to individuals as well as communities : the householder will find that he must not neglect his charcoal filter, and that artificial ice may be more impure than the natural ; the citizen, that danger accompanies sewage for many miles after its discharge into streams. Both will find that a thirteen per cent. increase of rainfall has followed increased care of forests in India. The residents of Washington, D. C., not long since, were greatly disturbed in the early morning hours by the discharge of high explosives in upper air with a view to obtaining rain, or an appropriation from the public treasury, possibly both : their annoyance would have been greater had they known that it was claimed that an impending rainstorm had been averted at Rome in 1539 by firing artillery in the direction of clouds which had already began to drop their moisture.

In the general arrangement of the subject matter, the sanitary precedes the chemical and bacteriological. But the last two must be studied to understand the sanitary. For this reason it would have been preferable to have reversed the order of arrangement. How to make chemical analyses, how bacteriological examinations, the preferable methods, when one class, when the other, or both, is fully set forth. But when we undertake to state even generally the scope of this treatise, difficulty is experienced on account of the wealth of information before us.

The spread of disease through the agency of drinking water ; the different methods of filtration on large and small scales ; the artificial and natural purification of waters ; the impurities of rain, ice, and snow ; flowing water, affected or not by tides, and associated with rainfall and evaporation ; forest influences upon evaporation and water-supply ; the storage of waters, sedimentation reservoirs, the benefits following the covering of reservoirs ; ground water and driven wells ; deep water and artesian wells ; per capita daily supply and its diminution by use of meters without diminishing the proper use of water ; the action of water upon metals, including the prevention of boiler-scale ; analyses ; statistics ; effects upon fish, of contaminated waters ; suitable water for various industrial purposes ; what are polluting liquids ; the use of sea-water for street-watering, sewer flushing and other purposes. All these are but general headings, not one of which but is of interest and importance to professional men, students and general readers.

One or two paragraphs concern troops in the field. The proportions are given of a mixture, composed of fine clay, aluminum sulphide and calcium permanganate, proposed in 1873, for addition to the highly impure waters of the Gold Coast before their use by troops during the Ashantee war ; the mixture, however, did not act quickly enough for use on the march. Twenty-two years later, on another Ashantee expedition, filters were found no good, and drinking water was boiled. Professor Mason's work shows reliance upon

* *Water Supply, Chemical and Sanitary.* (Considered principally from a sanitary standpoint.) By William P. Mason, Professor of Chemistry, Rensselaer Polytechnic Institute ; member of American Philosophical Society, American Chemical Society, American Water-works Association, New England Water-works Association, Franklin Institute, etc., etc. New York : John Wiley & Sons. London : Chapman & Hall, Limited. 1896. Pp. vii, 504.

the boiling of water to be well founded; ordinary boiling for half an hour will destroy about 99 per cent. of all bacterial life, and that which remains is entirely harmless; while boiling Seine water for but fifteen minutes removed about 95 per cent. of the bacteria found in it at its ordinary temperature.

Last but not least, a comprehensive table of contents is supplemented by more than a score of pages forming a copious index.

J. G. D. K.

The Armies and Navies of the Present Day.*

Since the English Government, about 1891, ceased the publication of much of the work of its Bureau of Military Information regarding foreign armies and navies, there has been no published, reliable source of such information available for the military student other than newspaper and periodical notes or his own travel and observation.

The Germans now propose to supply this lack by publishing a popular work under the title of "The Armies and Navies of the Present Day," in ten volumes, as follows:

1. Germany.
2. France.
3. Russia.
4. Austria.
5. Italy.
6. Great Britain.
7. Spain and Portugal.
8. Sweden, Norway and Denmark.
9. Turkey, Roumania, Bulgaria, Greece, Servia and Montenegro.
10. Holland, Belgium and Switzerland.

If this publication proves successful the scheme will be extended to include other nations.

The writers are able and experienced professionals and include in their number some of the best known military writers of the present day, which gives the reader the comfortable assurance that his information is accurate and reliable.

It is observed that the English army will be described by a Lieut.-Col. of the English General Staff, whose name is however withheld.

The first volume, on Germany, has just appeared (Sept., 1896). The army is described by Gen. von Boguslawski; the navy by Rear Admiral Aschenborn. There is also an additional chapter on the International Red Cross by Major von Straub.

Gen. Boguslawski begins with a short historical introduction followed by a presentation of the military laws of the empire and a description of all the essential principles of the military system, including universal military service, military sub-division of the country, peace and war strength of the army, two-year service with the colors, etc. Then follow the organization of the army proper, mobilization, interior administration of the various military units, arms, equipment and clothing of the different arms of service, etc.

Separate chapters are given to the Medical and Supply Departments, to military justice, to retirements and to pensions.

The chapter on tactical development in the three arms and the present tactics is of peculiar interest as coming from the pen of such an authority as Boguslawski. Apropos of this, the very latest army changes authorized by law will be found at the end of Boguslawski's work. The most important question involved is that of the fourth battalions. By the law of August 3, 1893, time of service in the infantry was reduced to two years and an average figure established for the peace strength.

The shorter time for training recruits into efficient soldiers rendered it necessary to make instruction and drill more active and intense than ever before. The increased strength of organizations, by the increased strength of the army, was somewhat of a com-

* *Die Heere und Flotten der Gegenwart, I. Deutschland.* Edited by Dr. J. von Pflugk-Harttung, Registrar of the Royal Privy State Archives in Berlin, etc. Published by Schall & Grund, Berlin, 1896.

pensation for the reduction in time allowance for training; and further advantage was expected from the organization of fourth battalions for each regiment, which were intended for three purposes:

1. To provide for supernumerary recruits after filling up the other three battalions.

2. And more important, to relieve the other three battalions of reduction in strength by details for detached service and for what corresponds in our service to extra and special duty.

3. To act as depot battalions at mobilization, by reducing and hastening the work of receiving and getting the reserves into shape for the line of battle.

But these fourth battalions have proved very unsatisfactory. It is true they have rendered the assistance to the other battalions which was expected of them, but this has made them so weak that it has been found impossible to drill them properly and bring them to a proper state of efficiency for war service.

It has been and is, then, a pressing necessity to remove this obstacle to the fighting efficiency of the army.

A bill is now beiore the German Parliament to authorize every two of these fourth battalions to be combined into one; every two such combined battalions to form a new regiment; and every two such regiments in each army corps to form a new brigade. This can be done without changing the total peace strength; and, with slight drafts from the other battalions, each of the combined battalions can be brought up to a strength of 500 men. The new regiments will have the same functions as the present fourth battalions. But they will do as much as and more than the old formation and be, at the same time, far more efficiently instructed as soldiers.

The proposed change will also be very much cheaper than the law of 1893 contemplated.

The conclusion to be drawn from all this, is, that the Germans believe there is a minimum limit of numbers for each unit, below which it is false economy to attempt or to expect the highest military efficiency.

The proposed bill contemplates that, beginning with April 1, 1897, the army shall be composed of infantry, 624 battalions; cavalry, 465 squadrons; field artillery, 494 batteries; foot artillery, 37 battalions; pioneers, 23 battalions; railroad troops, 7 battalions; train, 21 battalions.

The construction of the nickel steel field-gun adopted in 1891 is illustrated and described—as also the shovel brake used on field carriages. It is a pleasure to note that the German trooper is no longer clamped to his horse by an elaborate carbine case passing over his right thigh but that the American carbine boot, carried vertically behind the right side of the cantle, has recently been adopted.

The Germans still cling to the iron ponton; an error they would rue, should they ever attempt to cross a river in the face of American riflemen. In slinging the knapsack, however, the United States might do worse than adopt the German method, which is scientifically correct. The German overcoat too is better than ours. Ours gives but little warmth below the hips and the cape is of no particular use except as a head covering. The German coat has no cape, but is very long and soft and has a very high collar with a flap buttoning across the chin. With the German overcoat it is unnecessary to carry a blanket on the back.

It is of interest to note the intrenching tools carried not only by pioneers, but also by all infantry and other troops. The American disregard of this equipment is not easy to understand in view of the experience of our own wars and of other nations in more recent wars.

The Colonial forces in German Africa are also described, the latest army appropriations

given, and the whole is fitly concluded by a good map of the locations of the troops throughout Germany and on the frontiers.

The index is complete and detailed.

The Navy is treated in much the same method as the Army, by Admiral Aschenborn. Historical introduction is followed by description of legal status, details of organization, of personnel and of matériel. Systems of ship construction are described; then details of interior economy and discipline; administration and supply; uniform and equipment.

The chapter on the Red Cross describes its origin, development and spread, with details of its administration and of the work accomplished by it.

The volume is generously illustrated but, from an artistic point of view, the illustrations are not of the high grade to be expected from the wording of the preface. Some of the colored prints could not be improved on but the plates illustrating full length uniforms are poor. The black and white cuts are fair and the photographs very good. For a popular work such as this is intended to be the illustrations are however of great assistance and of much value.

The frontispiece of the Kaiser depicts that genial monarch as a hard-faced despot with a moustache *à la* Victor Emmanuel. The other portraits are much better and very satisfactory. The cuts of rifles, guns and projectiles are clear and valuable, but one misses, in general, the high grade illustrations of similar American publications.

It should not be forgotten that this is a popular work and, as such, much technical detail, useful only to special military students, has been omitted. But it is still remarkably complete. The indexing is very complete and the work is easy of reference and is invaluable as an up-to-date record of the armed strength of Germany.

It is a final satisfaction to note that it is the intention of the editor to issue new and corrected editions every five years, provided his labors meet with sufficient encouragement.

T. A. BINGHAM.

Publisher's Department.

THE Miller Lamp is an important feature in army life. While gas and e ectric lights rule in nearly every town and village in the United States, the dwellers at the military posts and stations throughout the land have to be contented without gas and electric light illumination. Even military posts near the most populous cities in the Union have oil illumination only. What wonder then that the dwellers at these posts try to secure the best lights obtainable. It seems that the majority of them have come to the conclusion that the "Miller Lamp," manufactured by Edward Miller & Co., Meriden, Conn., and sold by this firm at their stores in New York and Boston fills the bill.

It is found that it furnishes a light unexcelled by any other lamp, and the best device for lighting without removing the chimney. It has the most perfect flame and the best device for raising and lowering the wick. It has the simplest and best wickholder, and in short, it is the most durable, simple and scientific lamp ever offered for sale. A descriptive and illustrated catalogue will be sent by the firm upon application. Selections can be made therefrom and it will be found that the prices are very reasonable compared with those of other manufacturers.

* * *

The E. L. Anderson Distilling Co., at Newport, Ky., desires to remind the members of the service throughout the country that their business is still conducted at the old stand, and that they are ready at all times, as they have been heretofore, to give mail orders prompt attention.

It is a well-known fact that the quality and flavor of their liquors has always been unexceptional and this fact has been appreciated.

Go where you will, in every town and hamlet throughout the country the company's liquors are to be found. Their price lists, sent to all who ask for them, show that they sell good goods at low prices.

Orders received from military clubs at the different posts and stations will be attended to with dispatch and so will be all orders received from any individual member of the service.

* * *

The Bicycle for Military Use is now an assured success in the United States. It has just been put to a severe test in the Far West, and has shown beyond doubt that,

however problematical may be its advantages in actual battle, it is already of vast practical utility in various other purposes of military necessity. This test was made by a detachment of eight men from the 25th Infantry at Fort Missoula and was under the command of Lieutenant Moss. The men chosen were ordinary riders and the bicycles were the regular output of one of the big standard concerns of the east (**A. G. Spalding & Bros.** New York and Chicago). The test was to be 1000 miles over common mountain roads, with the riders equipped for such exigencies as might befall them in a scouting or messenger run through a hostile country. Besides 130 lb. of rations the party carried a complete rough camping outfit—blankets, rifles, thirty rounds of ammunition to each man, extra tires, and all the paraphernalia of a forced march. The average weight of the wheels packed was 77½ lb. The weight of wheel and rider ranged from 272 lb. to 202 lb. each. The result of the march was a surprise even to the strongest supporters of the bicycle. Lieutenant Moss reported that both soldiers and wheels had stood the journey remarkably well. The test was made as thoroughly as possible and under all conditions; they had ridden in all kinds of weather, through mud, sand, and dust, and scarcely a hitch occurred.—*Army and Navy Gazette, London.*

* * *

Atlanta Exposition, 1895. CRANE BROTHERS, WESTFIELD, MASS., BANK-LEDGER, RECORD, AND "ALL LINEN" PAPERS—GOLD MEDAL. The award of the gold medal was made to the firm of Crane Bros. for the general quality of their papers, their remarkable freeness from imperfection of any kind, and the evident care and skill of their manufacture. They were pronounced to be the most finely woven papers at the exposition and the high award made was granted unanimously. The old days of the paper facture, when almost any grade found a market, have gone by, and the perfection of machinery for all uses has made the attainment of the highest possible grade a necessity if the makers desire to remain in the markets of the world. The great legal and commercial transactions of the present demand a record that shall be permanent, and the paper that meets the purpose must be tough, strong, durable, able to stand a severe strain of fibre, and it must be perfectly sized as well. This last is of the greatest importance and depends, in every paper mill, upon the scientific knowledge brought to bear directly upon the processes of facture. In the Crane papers, the quality of sizing evidences that the chemical action of the inks in commercial use upon the gluten and gelatine is thoroughly understood and provided for. The success attained by their papers has only been achieved after years of patient labor and experiment but the result is an abundant reward for its cost. To-day, the trade mark of the Crane Bros. is known the world over, and their papers are endorsed and used by the leading stationers and blank book manufacturers of the country.

* * *

Small Steamboats. Why Some are So Much Better than Others. Referring to small craft in particular (25 to 150 feet) it will be found that the most suc-

cessful are fitted with modern Marine Steam Machinery built for that particular hull by some *one* shop.

The builder of the *complete* Machinery "outfit" (making it all and not subletting parts of the job to various shops) furnishes the boat builder with reliable details as to weights, and scale drawings showing dimensions and arrangement of the important parts, on what amounts to the same basis that is the rule in constructing large vessels, all of which is instrumental in producing a perfect craft. Thus the various parts, connections and fittings are suited to each other, and to the hull, all in *exact* proportion to the power, steam pressure, strain and maximum work which the boat may be called upon to perform.

Even boat builders and engineers of experience would, on investigation, be surprised to learn how few concerns there are who actually *build* the "complete outfit"; many subletting the work among different shops.

For the entire district tributary to Chicago, including the Mississippi Valley, there is but one company (**Marine Iron Works, Chicago**) who build *all* of the described machinery outfit, and making it their exclusive specialty, fully cover the line referred to, in propeller and paddle-wheel Machinery, condensing or non-condensing, as may be needed.

In the work described, the demand is so limited from any one district, that those giving it their entire attention, as is the case with the company named, must reach to distant points in order to justify the outlay required for facilities, patterns and equipment that are needed to keep pace with the varying requirements. It is manifest that each job has to be built to order to meet such needs, and that the designer and builder of the Machinery outfit be experienced in the construction and operation of steam craft.

* * *

The Seed is the Vital Thing. Planting must be begun right, else no amount of cultivation or fertilizer can prevent the crop being a failure. The first step is the selection of the seed. Do not take any risks here. Get seeds that you can depend upon—seeds that are fresh, that have a reputation behind them. The most reliable seeds grown in this country are Ferry's Seeds. Wherever seeds are sown the name of **D. M. Ferry & Co.**, of Detroit, Mich., is a guarantee of quality and freshness. The greatest care and strictest caution are exercised in the growing, selection, packing and distribution of their seeds. Not only must they be fresh, but they must be true to name.

On a par with the quality of the seeds is Ferry's Seed Annual for 1897, the most comprehensive and valuable book of the kind ever printed. Every planter, large and small, should get, read and digest this book before planting a single seed. It is free to all who address the firm as above.

* * *

Malt Nutrine and Beer.—It is a well-known fact that this health-giving liquid fluid, manufactured by the Anheuser-Busch Brewing Association of St. Louis, has become

a necessary article in most every household in the land. It has been found invaluable to those unable to take solid food, and it has given strength to those in need of it. No wonder then that this nutritive tonic has been in greater demand during the past year than ever before.

Of course, everybody has heard of the Anheuser-Busch Brewing Association as the manufacturers of the famous beer bearing their name. A gold medal has been awarded this association at every World's Fair during the past decade, the product of the brewery having been found to be without adulteration, and of superior quality. Of bottled beer there is a great variety. A handsomely illustrated colored booklet, furnished, upon application, by the Anheuser-Busch Brewing Association, will give the necessary information.

Announcement.

THE BOARD OF AWARD selected to consider the merits of the essays submitted in competition for the prize of 1896, have rendered their report, awarding the prize of the Institution to Captain J. S. Pettit, 1st U. S. Infantry, for the best essay on "The Proper Military Instruction of our Officers; the method to be employed, its scope and full development."

The essays of 1st Lieutenant R. G. Hill, 20th U. S. Infantry, and 2d Lieutenant L. C. Scherer, 5th U. S. Cavalry, received honorable mention.

The Military Service Institution.

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Resident Vice-Presidents.

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Membership dates from the first day of the calendar year in which the "application" is made, unless such application is made after October 1st, when the membership dates from the first day of the next calendar year.

"*An Entrance Fee of Five Dollars* ($5) shall be paid by each Member and Associate Member on joining the Institution, which sum shall be in lieu of the dues for the first year of membership and on the first day of each calendar year, thereafter, a sum of not less than *Two Dollars* ($2) *shall be paid as annual dues. Annual dues* commence on January 1st in each year."

NOTE.—Checks and Money Orders should be drawn to order of, and addressed to, "The Treasurer Military Service Institution," Governor's Island, New York Harbor. Yearly dues ($2.00) include Journal.

Changes of address should be reported promptly.

Prize Essay—1897.

I.—The following Resolution of Council is published for the information of all concerned:

Resolved, That a Prize of a Gold Medal, together with $100 and a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest, the subject to be selected by the Executive Council, and $50 to the first honorably mentioned essay. The Prizes will be awarded under the following conditions:

1. Competition to be open to all persons eligible to membership.

2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September* 1, 1897. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize;* and also in their order of merit those deserving of honorable mention.

In determining the essay worthy of the prize, the Board will be requested to consider its professional excellence, usefulness and valuable originality, as of the first importance, and its literary merit as of the second importance. Should members of the Board determine that no essay is worthy of the prize, they may designate one or more essays simply as of honorable mention; in either case, they will be requested to designate one essay as first honorable mention. Should the Board deem proper, it may recommend neither prize nor honorable mention. Should it be so desired, the recommendation of individual members will be considered as confidential by the Council.

4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Sept. 11, 1896, for the Prize Essay of 1897, is

"BASED ON PRESENT CONDITIONS AND PAST EXPERIENCES, HOW SHOULD OUR VOLUNTEER ARMIES BE RAISED, ORGANIZED, TRAINED AND MOBILIZED FOR FUTURE WARS."

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1897 are:

GENERAL WESLEY MERRITT,
GOVERNOR U. A. WOODBURY,
COLONEL H. W. CLOSSON.

JAMES FORNANCE,
Secretary.

GOVERNOR'S ISLAND,
Nov. 1, 1896.

Announcement.

THE Members and Associate Members of the Institution are respectfully informed that the biennial general meeting, called for by Article VI. of the Constitution, will be held at Governor's Island, N. Y. H., on the 13th day of January, 1897.